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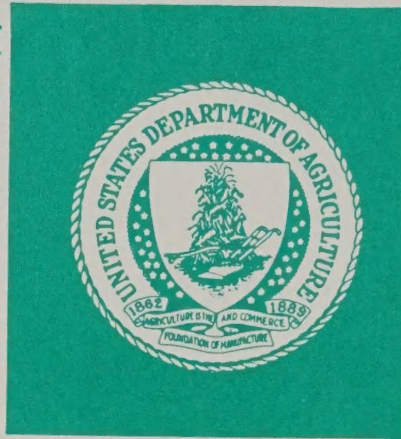
# The Political Economy of Agricultural Trade

## A Review of the Literature on Domestic Policy Behavior and International Price Formation

Linda Young  
Mary Marchant  
Alex McCalla

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**The Political Economy of Agricultural Trade: A Review of the Literature on Domestic Policy Behavior and International Price Formation.** By Linda Young, Mary Marchant, and Alex McCalla, Agriculture and Trade Analysis Division, Economic Research Service, U.S. Department of Agriculture. Staff Report No. AGES 9103.

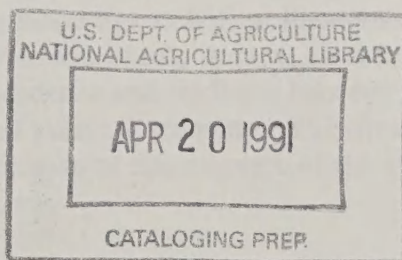
### Abstract

This paper reviews broad literature on political economy as related to agricultural trade. A framework for the analysis of policy in markets subject to extensive government interventions is developed. Literature is reviewed that addresses domestic policy formation in the political arena and the linkages between domestic political choices and their ramifications in international markets. The literature is characterized by a wide variety of models and quantitative techniques. There appears to be no convergence to a general model for endogenizing government behavior as results are often conflicting. One recurring theme is that the problem should dictate the model.

**Keywords:** Agricultural trade, political economy, endogenizing policy, policy, prices

### Note

Linda Young is an agricultural economist for the Australian Bureau of Agricultural and Resource Economics, Mary Marchant is assistant professor of agricultural economics at the University of Kentucky, and Alex McCalla is professor of agricultural economics at the University of California, Davis. The report was prepared when all were associated with the Department of Agricultural Economics at the University of California, Davis. This report was prepared under Research Agreement #58-3522-4-00299 with the Agriculture and Trade Analysis Division, Economic Research Service, U.S. Department of Agriculture.



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# **The Political Economy of Agricultural Trade**

## **A Review of the Literature on Domestic Policy Behavior and International Price Formation**

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### **Introduction**

The world economy in the 1980's was characterized by unprecedented and extensive economic interdependence among countries. The increase in interdependence was abetted by three major changes in international economic relations in the 1970's. First, the recycling of Organization of Petroleum Exporting Countries (OPEC) petrodollars greatly expanded international capital markets and led to nearly perfect markets, allowing capital to be transferred among nations almost instantaneously in response to small changes in interest rates. Second, the demise of the Bretton-Woods accord led to a system of floating exchange rates, which makes domestic fiscal and monetary policy less effective for domestic objectives. This is because changes in domestic policies in large countries also affect capital markets and exchange rates, resulting in the international transfer of inflation and recession. Third, rapid economic growth in the 1970's was, in many instances, led by expansion in open economies pursuing export-oriented strategies. As a result, global trade grew more rapidly than world gross national product (GNP), leading many countries to a greater dependence on trade.

These macroeconomic trends have linked countries closer together and have increased the transmission of domestic economic and policy shocks from one country to another. For example, many would argue that tight money in the United States, beginning in October 1979, contributed first to a U.S. recession and then to a global recession. This global interdependence makes all countries potentially vulnerable to policy choices made by other countries.

Policy choices are determined by domestic political processes. The decisions made by national policymakers are heavily influenced by domestic interest groups. But these choices are also influenced by economic trends and political events both at the domestic and at the international level. These policy choices affect economic trends which, in turn, are a major determinant of the political climate. Recognition of the interdependence and feedback between political decisions and economic processes has given rise to the field of political economy. This framework is appropriate for the study of many agricultural markets because of the structure of the market and the pervasive nature of government intervention.

### **The Nature of Policy Interdependence Between Countries**

Virtually every country intervenes in its agricultural sector and in the provision of food to its citizens. Usually this intervention involves differentiating between domestic and international prices by putting a wedge between the two.

Developed-country importers generally use border instruments in the form of tariffs and quotas to raise domestic farm prices and therefore production to limit their dependence on imported food.

Less-developed-country importers commonly use import subsidies to keep food prices low for consumers. Exporters, of necessity, have implemented a wide variety of policies. Developed exporting countries often try to support the income of their agricultural sector by implementing systems of price supports for agricultural commodities; the United States, for example, uses target prices and deficiency payments in pursuit of this goal. Export subsidies, supply control, and stock holding are other commonly used tools. Less developed exporters, on the other hand, frequently impose export taxes to keep consumer prices low.

In addition to differentiating prices, many countries insulate their producers and consumers from changes in world prices. This is done through variable levies, quotas, and the use of government purchasing agencies who sell food to consumers at a predetermined price regardless of the actual purchase price. The international market therefore is greatly influenced by the interaction of policy-induced residuals resulting from domestic policy.

Some countries are large in terms of their exports or imports of goods in specific commodity markets. Large countries, by definition, influence market outcomes in prices and trade flows. In each country, the policies enacted by the government affect the level of production and consumption. These policies therefore influence the nature of the country's relationship with world markets by determining the magnitude of a country's excess supply or demand. As large-country actors, their participation in the market will affect other countries through the amount traded or the price received. Thus, a direct link exists between one country's policies and another country's welfare.

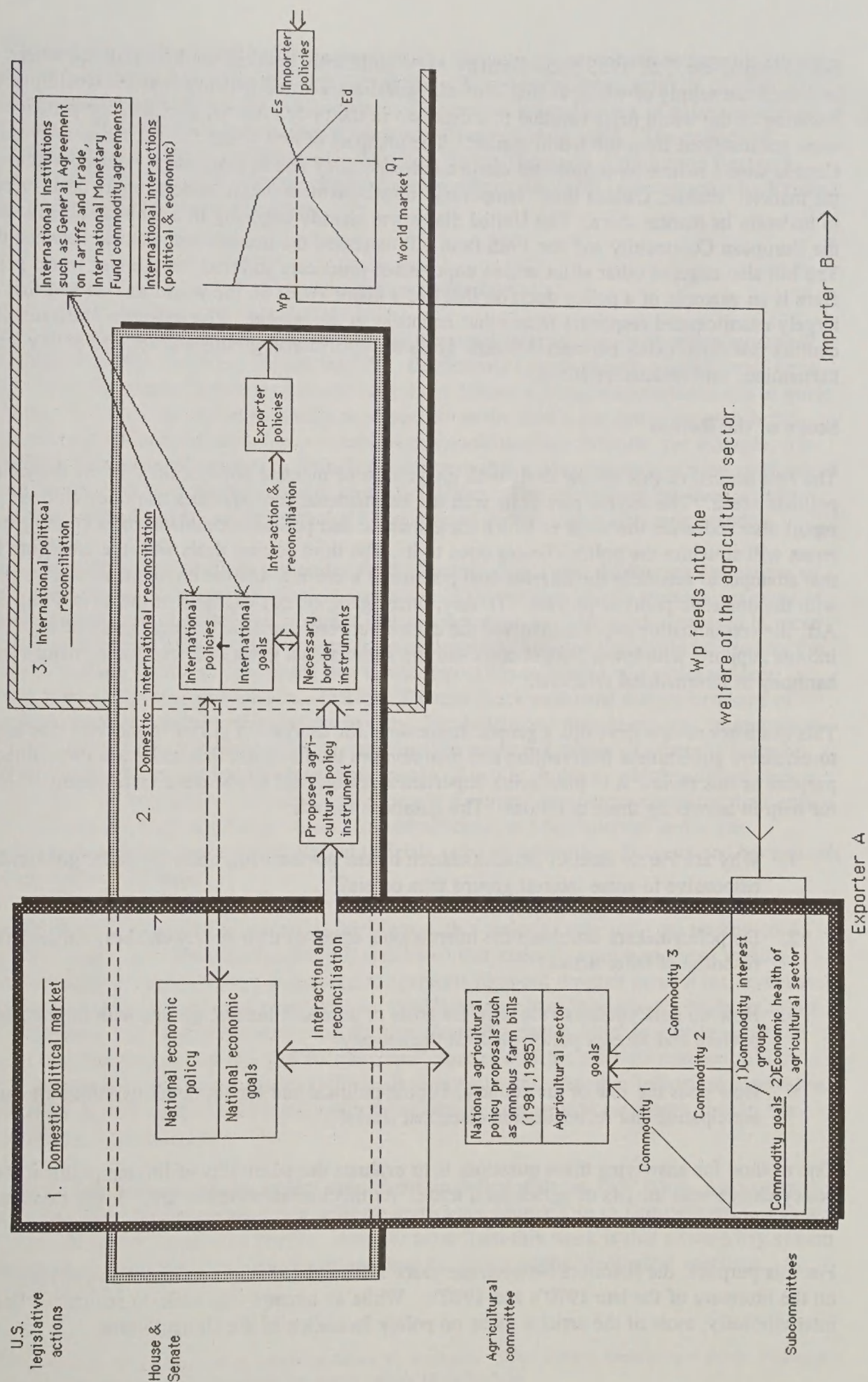
Two characteristics of agricultural commodity markets can be summarized at this point. First, the pervasive nature of government intervention means that the country, rather than the firm, is the appropriate unit of analysis when evaluating the effect of policy choices on the international market. However, the analogy breaks down when analyzing policy choice for a country, since many interest groups are involved in that choice. Second, the fact that many commodity markets have a significant number of large actors means that countries are policy-interdependent through the effects of their domestic policies on the world market and, through that market, on other actors. Let us take a simple two-country example to illustrate this point.

Figure 1 shows the nature of this interdependence. For simplicity, consider a two-country world--Exporter A and Importer B. We begin with the domestic political process, depicted on the left side of figure 1. The economic structure and condition of agriculture influence commodity groups and farm organizations in formulating commodity goals, which are aggregated into goals for the agricultural sector. Environmental, consumer, and antihunger groups also participate in this process. The difference between goals and reality results in the formulation of policy proposals by policymakers, such as the 1985 Food Security Act (frequently referred to as the "1985 farm bill"). These interact with and are reconciled with national economic policy to result in a proposed set of agricultural policy instruments which may, in an open economy, necessitate border instruments. The nation also has a set of goals and policies relating to economic and political relations with other countries. The policy process then must reconcile international policies, such as free trade, with domestic policies, such as trade barriers, which protect agricultural producers. This process of reconciliation is constrained by existing trade agreements and, in the case of large traders, is influenced by the anticipated reactions of other traders. The middle section of figure 1, depicts this process of domestic-international reconciliation. Its end result is the external (export) face of domestic policy, summarized by the export supply function ( $E_s$ ) of Exporter A.

Presumably, a similar process occurs in importing countries. In this case, the process results in an import demand function ( $E_d$ ) from Importer B. In a world of multilateral trade, there are a number of exporters and a number of importers whose excess functions interact in world markets--see section of figure 1 marked number 3--to form international prices ( $W_p$ ) and trade flows.

Figure 1

Interdependence of domestic policies and the world market



For example, the U.S. 1985 Food Security Act significantly lowered the loan rate for wheat. This increased the supply of wheat available on the world market and thus lowered the world price. This lowering of the world price resulted in a decrease in the price received by Canadian producers, who were not insulated from the world market. The prospect of low prices did not necessarily mean that Canada would reduce its supply and cause a corresponding rise in prices for countries remaining in the market. Rather, Canada took "temporary" direct payment measures to support farm incomes and to maintain its market share. The United States was already engaging in a limited subsidy war with the European Community and the 1985 farm bill increased the tension and rhetoric between the two. The bill also angered other allies whose unprotected producers suffered from lower world prices. Here is an example of a policy decision that had a major effect on the world market and that brought largely unanticipated responses from other countries in the market. The example illustrates the conflict that often exists between domestic goals for agricultural groups and foreign policy goals of harmonious international relations.

### **Scope of the Review**

The first section of this review deals with the process of national policy choice in the domestic political arena. The second part deals with the international consequences of policy choice. The report also addresses the ways in which the economic and political dominance of a country in global terms will structure the policy choices open to it. The third section deals with the emerging literature that attempts to reconcile the international posture of a country and the consequences of its policies with the domestic political process. To rely, once again, on our example of the 1985 Food Security Act, the reconciliation process involved the choice between domestic political goals of high farm income supports with lower budget costs and the international goals of a free trade posture and harmony in international relations.

This literature review develops a general framework for analysis of policy in markets that are subject to extensive government intervention and then reviews the literature that addresses this subject. The purpose of this review is to pose some important questions and to sample a wide variety of literature for help in answering these questions. The questions include:

1. Why are Pareto inferior policies chosen by the government, and why is the government more responsive to some interest groups than others?
2. Do policymakers anticipate the international effect of their policy choices, particularly the response of other actors?
3. How do policymakers reconcile the goals of domestic interest groups with the international posture and foreign policy goals of the country?
4. How does the size of the country, in both political and economic terms, affect the process of anticipation and reconciliation discussed above?

One method for answering these questions is to evaluate the possibility of linking political models of policy choice with models of agricultural trade. As this introduction has argued, the two are inextricably entwined.

For this purpose, the literature between the years 1935 and 1989 is reviewed with particular emphasis on the literature of the late 1970's and 1980's. While an attempt was made to search the literature internationally, most of the articles focus on policy formation in the United States.

Finally, note that the literature continues to grow rapidly. Two recent contributions deserve special notice. One is a book by Arye Hillman titled The Political Economy of Protection. It contains an extensive literature review and a large bibliography. The second is a collection of papers presented at an International Agricultural Trade Research Consortium Symposium in 1989. The collection, Imperfect Competition and Political Economy: The New Trade Theory in Agricultural Research, edited by Carter, McCalla, and Sharples, contains, among others, excellent review papers by Krishna and Thursby, Richardson, Moore, and Ray.

### Domestic Policy Formation

To understand markets characterized by extensive governmental intervention, economists must seek to understand why countries make the choices they do. Economists hypothesize that commercial firms maximize profits, and these economists have derived many behavioral implications from this to guide their analyses. The simplest and most widely used parallel to the firm's maximization goal is the theory that government policies are chosen to maximize a social welfare function, for example, the sum of producer and consumer surplus. This theory assumes that a government is a benevolent social dictator that implements policies to maximize society's welfare. This hypothesis has been widely disputed, and work in the field of public choice has attempted to investigate alternative models.

This section provides a brief introduction to the field of public choice and also to two derivatives of the field, namely rent seeking and government regulation.<sup>1</sup> This section briefly summarizes some of the pioneering work in the field of public choice that sets the stage for later work discussed in more detail. Kenneth Arrow (1970b) tried to construct a social welfare function that could be used by the government in making decisions. He found that it was impossible to construct a social welfare function that met certain desirable criteria. In 1958, Duncan Black evaluated the performance of majority voting rules in determining social preference. He determined that timing was an important element in the adoption of a proposal, since a single motion might not defeat all others in pairwise testing. These two authors presaged the emerging theory of public choice in which political choices could be evaluated on the basis of all individuals acting in a rational manner to maximize their own utility. This theory has been applied to voters, elected officials, and bureaucrats, and it has contradicted previous work that assumed elected officials acted as benevolent dictators and bureaucrats as selfless servants of the state.

In 1959, Tullock demonstrated that collective decisions with a majority rule and vote trading could make everyone worse off. Specifically, Tullock concluded that majority voting and vote trading resulted in too much government spending on public projects financed through general tax revenues. In The Calculus of Consent, Buchanan and Tullock (1962) showed how individuals, while acting in rational self-interest, in fact may formulate a collective action that seems 'fair' to a wide variety of individuals. The key assumption was that an individual, uncertain of his ultimate position, had a self-interest in rules that treated people fairly from all stations in life. Another important conclusion was that any voting rule results in a Pareto optimal decision as long as side payments, that is, the buying and selling of votes, exists.

Anthony Downs began to analyze the supply side of public policy with his 1957 book, An Economic Theory of Democracy. Downs argued that political parties are comparable to firms except that they attempt to maximize votes instead of profits. Another tenet from this work is that a two-party system shows a tendency for both parties to take positions near the center of the ideological spectrum. In

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<sup>1</sup>This brief summary relies heavily on an article by James M. Buchanan, "From Private Preference to Public Philosophy: The Development of Public Choice," Institute of Economic Affairs 18(1979):3-20.

1965, Tullock wrote The Politics of Bureaucracy and prepared the way for the modern analysis of bureaucratic behavior. Breton, in his 1974 work, The Economic Theory of Representative Government, attempted to integrate the demand for public policies by voters and the supply of policies by legislators and bureaucrats into a coherent equilibrium framework.

Rent seeking is a variant of public choice formalized in the work of Anne Krueger (1974). Rent seeking is seen as a profit-motivated activity of firms that expend resources to gain access to rents created by government policies. These rents are created by restricting access to imports or exports, by occupational licensing, or by a wide variety of access-limiting regulations.

Government regulation studies grew out of the work of academics who wanted to put the implications of public choice theory to empirical test. George Stigler (1971, 1972, and 1974) was a leader in this area with his work on the government regulation of industry. His major hypothesis was that regulations work for the benefit of the industry and are usually imposed in response to industry pressure.

This brief introduction to the pioneering work in public choice theory is meant to provide only a background for the discussion of more recent work, which concerns the policy process in general and agricultural policy in particular. Questions of interest include:

1. What makes interest groups effective? This pertains to the additional question of why some agricultural commodities have received a much higher level of protection than others.
2. How do legislators make decisions between the conflicting needs of interest groups and the broader concerns of national welfare? Are legislators simply vote maximizers seeking re-election, or does ideology play a significant role in their decisions?
3. Why do legislatures enact policies which are Pareto inferior?
4. Are the forces that motivate the adoption of a new policy different from the motivation simply to adjust old policies on an annual basis?
5. Why have agricultural policies displayed so much continuity, despite drastic changes in the structure of the farming sector?

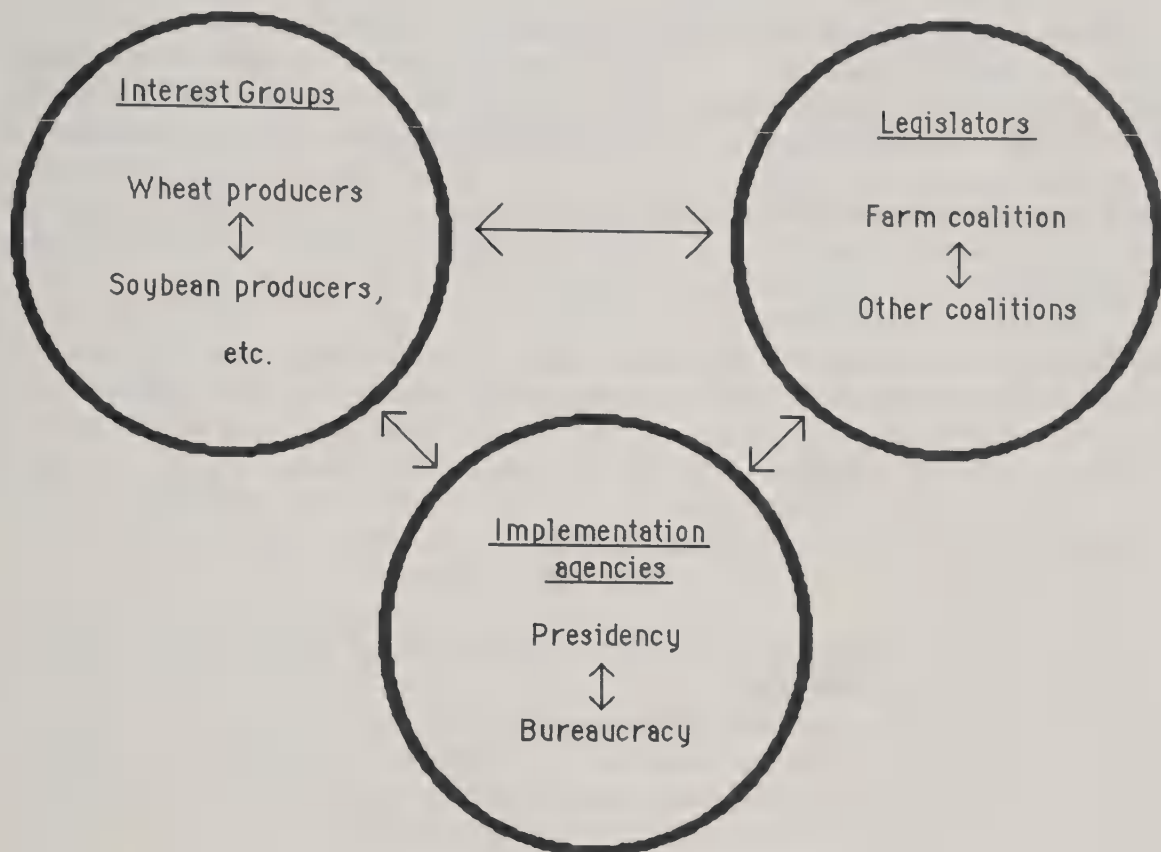
Figure 2 depicts the three categories of actors under discussion: interest groups, legislators, and implementing agencies (Hardin, 1952). This literature review deals first with the characteristics of each and then with the interactions among components of each group. This latter includes the interactions between legislators as they form voting coalitions and those between agricultural interest groups as they form lobbying coalitions. The review then moves on to examine the nature of the interactions between interest groups and legislators, interest groups and the implementing agencies, and implementing agencies and legislators. Implementing agencies include the Presidency and the executive branch. The section ends with an examination of some of the institutional changes that have been important in structuring the policy process.

## **Interest Groups**

We begin with a focus on interest groups because many would claim that interest groups are the driving force behind much of agricultural policy today. The interest groups concerned with agricultural legislation include: producers; agricultural input, processing, and distribution industries; food consumers; and taxpayers. Producers have been the most active in attempting to influence legislation to the point of overshadowing all other groups. Their activity stems from the direct

Figure 2

Interaction among interest groups, legislators, and implementation agencies in domestic policy formation.



influence that legislation affecting the consumption, production, and trade of commodities has had on their livelihood.

Let us go back to our earlier example concerned with the trade impact of the 1985 farm bill. An understanding of the outcome must begin with its welfare effects on wheat producers. A variety of programs have been enacted to assist wheat producers, including loan rates and target prices, surplus disposal programs, and acreage reduction programs. Although there is a divergence of opinion among producers on the appropriate role and scope of government programs, many producers have lobbied for the continuation and enlargement of assistance programs. Given that they seek certain policies from the government, how do they go about attempting to procure them? And if producers of other commodities also desire government programs, what contributes to the different levels of success they achieve?

Mancur Olson has done extensive work on the relationship between the size and effectiveness of special interest groups. Olson (1965) stated that large groups are politically ineffective, compared with small groups in obtaining political favors for two reasons. First, due to the large number of members, the individual gain from participation is small relative to personal costs. Second, a free rider problem exists in large groups, as each person hopes someone else will do the work. Small groups are effective because the gains from participation are high because they are distributed to fewer members. Seeking an explanation of why large groups exist if they are less effective, Olson studied labor unions, farm organizations, and professional organizations. He concluded that the political activity of large groups is a byproduct of other goals. For example, he argued that farm

organizations were originally formed for the purpose of providing technical assistance, cooperative marketing, and crop insurance.

Browne (1986) examined the role of agricultural interest groups in the formulation of the 1985 farm bill. He claimed that it is impossible to understand why programs are initiated, modified, or eliminated without understanding the role of interest groups. This is a difficult task because interest groups seldom leave a trail for researchers to evaluate. Browne attempted to explain why, with such widespread desire to reform farm programs, the outcome of the 1985 farm bill was only marginally different from the unpopular 1981 farm bill. His underlying hypothesis was that the diverse and fragmented approach to lobbying, caused by the multiplicity of narrow interest groups, was the major impediment to the apparently widely desired restructuring of farm policies. He described in turn the role of agricultural economists, general farm organizations, single-commodity interest groups, and agricultural industries.

Browne noted that agricultural economists were unusually unified in their assessment that farm programs must be drastically modified. Their stance against the nonmarket orientation of the previous farm bill was in keeping with the general economic climate of the time. Extensive economic analysis was performed on the consequences of farm programs and on alternatives to the existing programs, and numerous conferences were presented to disseminate the results of this research. Browne presented the role of agricultural economists at that time as similar to that of any interest group with a stake in the matter.

The general farm organizations had to try to take a stand on the farm bill that would unify their diverse memberships--a difficult task to achieve. The American Farm Bureau had to attempt to pacify members who had become active in the agrarian protest movement. The Alabama Bureau and those of a few other States had begun to present their views independently. The appearance of divisiveness reduced the Farm Bureau's image and its corresponding negotiating power with Washington. Although the Farm Bureau tried to form a coalition with other farm groups, it found them unwilling to accept alternatives to high price supports. Acceptance of high price supports as a policy position would have meant that the Bureau had to abandon its long-held free market stance. All of the general farm organizations were plagued by difficulties in trying to find a position that would satisfy the diverse needs of their members, uphold long-held philosophies, and satisfy the portion of their membership experiencing a financial crisis.

The Reagan administration presented a bill with such drastic changes that no one, not even its traditional ally, the Farm Bureau, wished to support it. Thus, Congress found little consensual agreement among groups with a broad perspective on the farm program, and this lack of consensus made it extremely difficult for it to act.

What Congress did, however, find was a multiplicity of single-commodity interest groups that were well informed about the language and provisions of the specific programs that they were attempting to influence. Unlike the general farm organizations, the academics, and the administration, the commodity interest groups were not concerned with the whole picture but with the self-interest of the producers of a single commodity. These influence groups were powerful agents for the maintenance, not the evolution and change, of programs.

It had been speculated that the agricultural input and processing industries would have an important influence on the policy process. This did not occur, despite their increased awareness of the consequences of farm programs for industry profits that were caused by the massive land retirement programs under the 1983 Payment-In-Kind program (PIK). Browne argued that business groups felt some reticence about a stand that would antagonize their customers, the farmers. The middle of a

well-publicized farm crisis seemed a poor time to take on a political battle that would be perceived as being against the farmers.

Browne concluded that no one was satisfied with the bill upon its completion. He stated, "The major provisions, however, are the logical outcomes of a farm bill that was negotiated in an exceedingly complex environment. It was not an environment where a single rational perspective or paradigm could dominate discussions. Instead, different perspectives on what were the most critical conditions to address in the bill undermined each other to produce a rather schizophrenic looking act that could be maintained only through massive expenditures" (Browne, 1986, p. 15).

In this report, the foregoing section has presented two views of interest groups and how they operate. In the first, Mancur Olson (1965) suggested that small interest groups with a unity of purpose are the most effective. In the second, the description given by Browne of the role of interest groups in the 1985 farm bill debate supports this conclusion. Browne depicts the disarray that plagued the general farm organizations as their diverse membership could not agree on a course of action. He contrasts this with the single-commodity interest groups who tended to be more unified in their purpose and who were very effective in achieving their goals.

## **Legislators**

The other side of the equation in understanding the support given to various interest groups is understanding the legislative voting decision for given policies. What are the determinants of legislative decisionmaking? Are rural legislators motivated by the need to secure the votes of their district's producers? Do urban legislators trade votes in order to secure passage of legislation that interests them? What role does ideology play, particularly with the long-enduring popularity of the goal of supporting the family farm? The three sections which follow address such questions and concentrate solely on the legislative decision process. In subsequent sections, further insight is gained from the work of de Gorter, Pittman, and Welch.

### Interactions Between Legislators

James Kau and Paul Rubin (1979) examined the determinants of congressional voting decisions. They postulated that economic self-interest on the part of the legislator, ideology, and vote trading are the major determinants of votes. They proposed the use of logit analysis with rollcall vote data as the dependent variable to test their hypotheses. Kau and Rubin used an ideological rating index constructed by a liberal interest group as a measure of the Congressman's liberalism. This rating was determined by the Congressman's past voting record. The rating was first regressed on a wide variety of variables to determine its association with liberalism. Significant factors included income, the percentage of the Congressman's constituents living in the central city and the percentage belonging to unions, the level of education, and consumer awareness. The votes from 26 bills were regressed on the ideological rating, the variables being those discussed above as well as other variables which captured a legislator's economic self-interest. The results of the study show that the ideological rating was almost always significant. Kau and Rubin concluded that their results indicate the existence of a liberal coalition in Congress that includes residents of central cities, consumers, and union members.

Kau and Rubin recognized that their results may be explained by vote trading between members of these coalitions with self-interest, not ideology, acting as the guiding force. They felt that the inclusion of other economic variables in the equation should address this problem. After further testing, they concluded that their results supported their original hypothesis, that is, that ideology is the major determinant of voting. Kau and Rubin did not address all voting problems with their methodology. They stated that the legislator's past voting records were used to construct the

ideological rating. But, this study does not make clear why these initial votes were motivated solely by ideology. The readers were given no assurance that economic self-interest or logrolling were not important factors influencing the construction of the ratings. This results in an apparent circularity where votes determine ideology and then ideology determines votes.

Weingast, Shepsle, and Johnsen (1981) examined why a cooperative legislature is inefficient in the sense that it is content with policies that are Pareto dominated. They recognized the gap that exists between normative economics and the decisionmaking process of legislators. They identified three factors contributing to this divergence. The first factor is the divergence between the political and economic definitions of costs and benefits. A second factor is the mechanism of districts, which divides a unified economy into disjointed political units. The last factor is the method of financing district-specific projects through generalized taxation. The legislator, in evaluating the desirability of a project for his district, will consider its effect on these groups:

1. In-district consumers who benefit from consumption;
2. In-district factor owners who benefit from consumption and from selling their resources for use in constructing the project; and
3. In-district consumers who make factor market purchases.

The authors concluded that legislators will neglect a project's effect on out-of-district consumers and factor owners. Their decision is based solely on who wins and loses within their own district, and does not consider the total economic effects, especially out-of-district ones. The effects are compounded by the fact that pecuniary gains to a small, organized group who are benefited tend to be exaggerated, while diffuse losses to society as a whole tend to be discounted.

Vote trading (also known as logrolling) has been an important strategy for legislators concerned with agricultural policies since the 1920's. Because farm bills deal with a variety of crops, legislators concerned with one crop will support the interests of other groups in order to secure the passage of legislation beneficial to all. As the U.S. agricultural population declined, it was no longer sufficient for rural legislators to form coalitions among themselves, as even together they lacked the votes necessary to pass farm legislation. In the 1960's, food stamps were reintroduced as a part of the U.S. Department of Agriculture's (USDA) program which expanded the benefits of the USDA to the urban sector, and this no doubt contributed to obtaining vital urban votes.

Weldon Barton (1975) discussed examples of logrolling in the formation of the 1973 farm bill. He first discussed the coalition of interests between legislators concerned with wheat, feed grains, and cotton, because their production collectively is geographically dispersed, and therefore they could elicit support from across the Nation. Barton notes that farm interests have needed to garner more support from urban districts with the passage of each successive farm bill. This is because the percentage that rural districts made up of an absolute majority declined from 83 percent in 1966 to 60 percent in 1973. Barton states that legislation for the farm bill was scheduled close to legislation for the minimum wage to facilitate vote trading between urban labor and rural interests. Barton concludes by noting that the coalition between farm and labor interests may continue but that it is unclear whether that coalition alone will be sufficient to guarantee continued passage of farm bills given other changes in the economic and political environment. A recent paper by Abler addresses logrolling in the context of the 1985 and 1986 debates on farm legislation.

The divergence in opinion among Kau and Rubin; Weingast, Shepsle, and Johnsen; and Barton is indicative of a general lack of consensus in the literature about what motivates a legislator's decisions. Kau and Rubin recognize economic self-interest, ideology, and vote trading as possible determinants

of voting behavior. However, on the basis of their empirical work, they conclude that ideology is the most important. This contrasts with the work of Weingast, Shepsle, and Johnsen who assume that a legislator is motivated by the economic self-interest of his constituents. Barton's article concentrates solely on vote trading as a determinant of voting behavior.

### **Implementing Agencies**

A number of agencies are concerned with the design and implementation of agricultural policy. Within the USDA, the Agricultural Stabilization and Conservation Service (ASCS), the Soil Conservation Service, the Foreign Agricultural Service, the Agricultural Marketing Service, and the Forest Service are important implementers of agricultural policy. The Commodity Credit Corporation is affiliated with the USDA and is responsible for the implementation of much of the legislation passed in omnibus farm bills. From the executive branch, the Office of the Special Trade Representative and the Office of Management and Budget are major players. This partial list of the bureaucracies involved demonstrates the importance of evaluating bureaucratic behavior when attempting to understand policy formation.

Tullock (1965) provided an inside view on the workings of bureaucracies. He described the characteristics an individual must have in order to move up through the ranks. Tullock evaluated the process of decisionmaking and concluded that the power of top management diminishes with the size of the organization. He found bureaucracies tend to be victims of Parkinson's law, which rewards managers for maintaining or increasing the size of their bureaus instead of for their efficiency.

William Niskanen (1971) formalized the theory of bureaucratic growth. He developed a model of budget-maximizing departments. Rewards for managers are based on the size of the budgets that they administer, which acts as an incentive for growth. Niskanen used this model to show that bureaucracies will therefore grow far beyond the size needed for the efficient distribution of services.

Charles Hardin was one of the first to discuss the political aspects of institutions in his 1952 book, The Politics of Agriculture. The first half of this work focuses on the struggle between interests involved with soil conservation policy. The second half examines politics within the USDA and various attempts to reorganize its programs.

While Allison (1984) proposed three different models of government behavior, only the organizational process model is discussed here (see below for a discussion of all three models). In this model, government behavior is not seen as a deliberate choice but as the output of a large organization functioning according to standard patterns of behavior. The actions taken by the organization in the past are important determinants of the options available in the future.

Bureaucracies within USDA are important players in the policy process. They maintain close ties with producer organizations and are knowledgeable about the policies desired by producers. Both Tullock and Niskanen point to the desire of bureaucracies to expand, or at least maintain, the size of their bureaus. This means that they will resist legislation that terminates the policies they are responsible for implementing, and this provides additional impetus to maintain policies that are no longer needed. Allison's organizational process model supports the importance of inertia in the working of bureaucracies, which are guided by rules and procedures and which are reluctant to make major changes.

### **Interactions Between Groups**

The following section discusses the relationships between interest groups, legislators, and implementing agencies. It begins with a discussion on the relationship between interest groups and

legislators, distinguishing between legislators currently in office and those running for office. Two examinations of the relationship between interest groups and the President are then presented. The last section utilizes the theory of rent seeking to examine the interactions between interest groups and the bureaucracy.

### Interest Groups and Legislators

Interest groups can attempt to pursue their goals by influencing legislators currently in power and by attempting to influence legislative races.

Interactions Between Interest Groups and Current Legislators. Jennifer Reinganum (1983) analyzed strategic lobbying behavior to determine the optimal rate of lobbying expenditures by interest groups attempting to influence policies. She began by analyzing the optimal rate of lobbying when there are no interest groups opposing the policy and then compared those results to the case when a counter-lobby exists. In both cases, the losses from enactment of the proposal are diffused over a large population, while the benefits accrue to few individuals.

Reinganum used optimal control methods to analyze the case of no counterlobby. The lobbyist chooses lobbying expenditures to maximize their payoff, which is defined in terms of profits. The equation of motion constraint specifies the change in accumulated lobbying effort (a stock of goodwill) as a function of the current effort (state variable) and lobbying expenditure (control variable). She concluded that lobbying expenditures would increase over time and with an increase in the value of the decision. On the other hand, lobbying expenditures would decrease if there were already a high probability for a favorable decision.

Lobbying against an organized opposition in favor of the status quo was the second case analyzed. The lobbyist must consider the fact that the counterlobby will react to the lobbyist's actions and that the reverse will also be the case. Reinganum used dynamic game theory with each lobbying group as a player who invests in lobbying to obtain decisions favorable to them. Now the opposing lobby's state variable is part of the decision for the amount of lobbying investment.

Results differed in the presence of a counterlobby from the first case, in which no opposition existed. Specifically, lobbying expenditures do not necessarily increase with time. The lobby in favor of the new legislation increases its expenditures in order to secure new opportunities for wealth, while the counterlobby increases expenditures in order to protect its existing wealth.

Government regulation has also been examined. The theory of economic regulation investigates the motivations for and the processes of government regulation. The benefits to industries of various forms of regulation are discussed and form the basis of the demand for economic regulation. Legislators provide the supply of government regulation through their votes on the expenditure of public resources and the adoption and structure of regulation. They attempt to maximize what they receive from beneficiary groups in terms of votes and monetary support. In doing so, they must balance this support with dissatisfaction from voters who oppose the regulation. Political power relationships are assumed constant throughout the analysis and have been compared with the role of tastes in consumer choice theory. The framework concentrates on changes that occur within a stable power relationship. Theorists in this school presume a zero sum game, and so, the wealth of one group is increased only by decreasing that of another. The cases of government intervention considered are limited to government failure, analogous to the PEST activities described by Rausser

(1982b).<sup>2</sup> These activities generate a deadweight loss, and so, government intervention to correct market failure is not considered. The losses that result from various forms of regulation and their effect on various groups in society are discussed.

Stigler (1971, 1972, and 1974) investigated the uses of public resources and power to improve the economic status of interest groups, focusing on producer groups. He began with a thorough discussion of the potential benefits that the state can legislate for an industry, including control over entry, tariffs, and price fixing. He used these motivations to analyze the demand for regulation by industrial interest groups and discussed what these groups are willing to do to secure the legislation that they desire. Industries must be prepared to provide votes and resources to obtain legislation favorable to them. Stigler noted that representatives cannot win or keep office solely with the support of those opposed to various interest groups. "If the representative denies ten large industries their special subsidies of money or governmental power, they will dedicate themselves to the election of a more complaisant successor; the stakes are that important" (Stigler, 1971, p. 11).

Stigler then investigated why such protection occurs when it entails a deadweight loss for society. He evaluated the cost of information to individual voters and concluded that the costs are too high for an individual to be well informed about all matters before the legislature. He stated that the system is calculated to implement all strongly felt preferences of majorities and many strongly felt preferences of minorities but to disregard the lesser preferences of both majorities and minorities.

De Gorter (1983) stated that traditional economic analysis assumed the government to be an autonomous entity that intervenes in a rational and disinterested manner to correct market government failure. De Gorter rejected this model of government behavior, because it ignores self-interest, the cornerstone of economic analysis. He separated activities into an economic market for goods and services and a political market for government regulation. The pursuit of rents is seen as legitimate, with the goal being to efficiently transfer resources from one group to another. As de Gorter does not postulate a social welfare function, and as economic efficiency is not the criterion for judging the success of a system, deadweight losses are no longer a matter of concern. De Gorter sharpened the analysis of political demand and supply with the use of a standard marginal cost-marginal benefit framework. In the political market, producers and consumers demand government intervention, such as taxes and subsidies, to enhance their own welfare. The optimal amount of political pressure to exert is determined by equating the marginal gains in terms of political intervention to the marginal cost of campaign contributions. The supply of political goods and services is provided by Congress. Politicians maximize their political welfare, defined as the probability of re-election. They choose intervention policies by supporting the position that will maximize their reelection chances by equating the marginal cost of votes and contributions lost to those gained. De Gorter then integrated the problems facing producers, consumers, and politicians to obtain the supply and demand for government intervention. Similar approaches of generating models of the optimal level of expenditure on interventions are contained in Balisacan and Roumasset (1987) and Gardner (1987b).

Reinganum, de Gorter, and Stigler each investigated the interaction between interest groups and legislators. All three recognize that interest groups attempt to influence legislative decisions through expenditures of time and money. A major difference exists between de Gorter and Stigler over the welfare effect of government policies. De Gorter views the pursuit of rents as legitimate, with the goal being to efficiently transfer resources from one interest group to another. In contrast to this,

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<sup>2</sup>Rausser evaluated two types of government intervention, dividing them into PEST and PERT activities. "Political economic-seeking transfers" (PEST) are activities that occur when the government is manipulated by interest groups that seek to improve their welfare through transfers. Interest groups compete for transfers by spending time and money to pressure legislators for regulations favorable to their interests. Activities to correct market failure are called "political economic resource transactions" (PERT). The net effect of PERT activities is to increase the size of the economic pie.

Stigler is concerned with the deadweight loss that occurs when legislation favorable to interest groups is enacted, and he discussed the characteristics of a democracy that allow such inefficiency.

Voters Influencing Elections. Brock and Magee (1978a) divided the political world into lobbies and politicians. They discussed optimal decision rules for lobbies and politicians to use in maximizing their individual objectives as described below. Lobbies seek to maximize the net economic returns to a campaign contribution with the ultimate goal of obtaining favorable tariffs. They should follow these rules:

1. If the lobby is too small to affect the results, then the lobby should not contribute to either candidate.
2. If the lobby is large enough to be effective, then it should contribute to only one candidate.
3. If both politicians support the same level of a tariff, then the lobby should not contribute to either candidate.

Politicians seek to maximize the chance of reelection. This depends on votes and on contributions from interest groups. Two possibilities exist:

1. No organized free trade lobby exists. If your political opposition (player 1) supports high tariffs and is maximizing contributions, then you (player 2) should choose a middle position to get some contributions but should concentrate on picking up the free trade vote.
2. An organized free trade lobby exists. In this case, you should follow a minimax strategy where player 1 emulates the actions of player 2 and player 2 counteracts the actions of player 1. For example, if player 2 proposed a tariff increase, then so would player 1. But if player 1 proposed a tariff increase, player 2 would propose a tariff reduction.

Pittman (1977) investigated the relationship between campaign contributions to legislators and the characteristics of the donating industries. He hypothesized that a firm will attempt to achieve policy influence only if the government plays a significant role in the industry in question. Furthermore, in concentrated industries where there is less discrepancy between the firm and the industry, motivation to contribute to legislators is hypothesized to increase.

Pittman used data on campaign contributions made when the donor believed that this information would remain secret. These data were subsequently released through a Common Cause suit against the Committee to Reelect the President. Pittman believed that the present publicity surrounding campaign contributions has made them less attractive as a vehicle for influencing legislative decisions. He regressed the level of campaign contributions by each industry on variables representing the extent of: (1) industry regulation, (2) industrial dependence on government purchases, (3) vulnerability to antitrust action, (4) concentration, and (5) size in terms of the number of employees. Pittman evaluated his results for concentrated and unconcentrated industries separately. He found that, for unconcentrated industries, none of the five government influence variables was significant. For the concentrated industries, all five variables were significant. Pittman concluded that the results offer impressive support for his theory that these variables increase the level of campaign contributions.

Welch (1980) constructed two models to test hypotheses about why special interest groups contribute to political candidates. In each model, political favors were sought, and the outcome of an election was uncertain, requiring consideration of the probability of the election's outcome.

What Welch calls the Exchange Model hypothesized that interest groups contribute to candidates to obtain political favors. Contributions are given to likely winners without influencing the given probability of electing a particular candidate. The special-interest group allocates money by maximizing its expected utility from the candidates in all districts subject to a budget constraint. The first-order conditions are solved to obtain the size of the contribution.

Welch's Influencing Elections Model hypothesized that interest groups attempt to influence the outcome of close races by contributing to candidates on the basis of their past voting record. A candidate's probability of winning is a function of the contributions he receives. Data from six major contributing interest groups were analyzed using Tobit analysis. Five groups were associated with labor unions and one with the American Medical Association. Campaign contributions were a function of expected percentage of Republican and Democratic vote, Republican and Democratic incumbency, and the score of the incumbent's legislative voting according to the interest group. Empirical results supported the Exchange Model, and Welch concluded that interest groups contribute to candidates who are most likely to win rather than trying to influence election outcomes.

In a recent work, Hillman and Ursprung (1988) investigate whether it is in a foreign country's interest to support candidates in the United States who would approve tariffs. The foreign countries' interests are contrary to U.S. domestic producers' interests. However, both groups have a common interest in supporting voluntary export restraints (VER's). These authors conclude that "no candidate has an interest in formulating a trade policy position using a tariff if a VER is a policy option" (p. 729).

Brock and Magee, Pittman, and Welch each investigate when a lobby should contribute to a legislator running for office. But, as these investigations focus on different political variables, their conclusions are not directly comparable. Brock and Magee conclude that a lobby should contribute only when it is large enough to be effective and only to one candidate. Pittman, on the basis of empirical work, concludes that industries that already have significant government involvement and that are heavily concentrated will contribute more. Welch's empirical work shows that interest groups are more likely to contribute to candidates who are likely to win than to seek to influence overall election outcomes. It is likely that all three are partially correct, given the multiple dimensions of the political process.

Interest Groups and the President. Finger, Hall, and Nelson (1982) and Frey and Schneider (1978) discuss the relationship between interest groups and the President. Finger, Hall, and Nelson discuss when a decision will be made by the bureaucracy and when it will be elevated to the Presidential level, while Frey and Schneider discuss the influence of Presidential popularity on Presidential decisionmaking.

Finger, Hall, and Nelson (1982) argued that trade restrictions are seldom voted on in Congress and that pressure for protection is usually applied through the administration of import regulations. The antidumping and countervailing duty procedures and the escape clause mechanisms are cited as examples. The authors distinguished between high- and low-policy tracks in terms of their political visibility and costs of operation. The antidumping and countervailing duty procedures were proposed to be low track, meaning that cases are determined according to the law, administrative procedures, and precedent. High-track decisions are less circumscribed by rules and regulations, requiring attention by government officials entrusted with discretionary power and sensitive to the application of political pressure. Political power is felt in the low track when the laws are originally implemented. The low track minimizes the political costs of decisions because the administrators are bound by rules and do not have to weigh and decide between the interests of those concerned. Finger, Hall, and Nelson argued that the lower track will not function well unless it is biased in favor of one group. In the case under consideration, the less-than-fair-value procedures are biased in favor of producers, since the agency has the power to impose trade restrictions but not to remove them.

High-track procedures are characterized by a relaxation of the technical criteria to allow cases to be decided on the basis of political factors. A high degree of public awareness of the petition will change the criteria on which it is decided. The escape clause is a high-track procedure in which industries may petition for an investigation of "injury" from imports. If the International Trade Commission finds evidence of injury, it makes recommendations to the President, who has the ultimate decisionmaking power.

If public awareness is high, Finger, Hall, and Nelson hypothesized that the President will say no simply to discourage further petitions and the political costs incurred in deciding them. If possible, the President will avoid making a decision at all by ordering the negotiation of an orderly marketing agreement. Empirical results indicated that the functional difference between high- and low-track cases was the level of public awareness of the interests at stake, not the issues themselves. If the issue is obscure, the lower track works for the interest group, but this cannot dilute the opposition of a highly visible petition.

Frey and Schneider (1978) described the tradeoff that Presidents face at times between maintaining their popularity and acting on their own ideology. The Reagan administration's ability to fight the protectionist tendencies of Congress was certainly influenced by its high overall level of popularity.

Frey and Schneider argued for the need to include government behavior as an endogenous part of the economic system. They claimed that the study of political economic interdependence is necessary to forecast. They continued by arguing that, since economic trends are heavily influenced by government behavior, treating government behavior as an exogenous variable severely limits the usefulness of forecasting models.

Additionally, these authors stated that economic policy advice is often ignored because it is formulated without accounting for the pressures under which politicians live. But, the authors' hope that political economic modeling will help economists consider political realities and, because of this, offer advice that has a better chance of being accepted.

Frey and Schneider hypothesized that both voters and the government are utility maximizers and that the government's choices are constrained by economic, political, and administrative constraints. They proposed that the President's popularity fluctuates with changes in the performance of the economy. As unemployment or inflation rises, the President's popularity declines, while increases in personal consumption will increase popularity as well. Accordingly, the government will attempt to steer the economy to increase consumption when it feels that Presidential popularity has fallen too low, particularly if an election is approaching. If his popularity is high, the President is more apt to pursue his ideology whether or not a particular action is popular with the electorate.

Frey and Schneider formulated two functions to capture the interaction between economic conditions and government actions. The popularity function describes the relationship between the state of the economy and the President's level of popularity. They estimated this function with popularity as the dependent variable and unemployment, inflation, consumption growth, and a dummy for the personality of each President as explanatory variables. Popularity is represented by the responses to Gallup polls and is indicated by the percentage of the population that is "approving or disapproving of the way Mr. ... handles his job as President." These authors concluded that their results are good and indicate a strong relationship between the economy and Presidential popularity.

They then proposed and estimated a model for the reaction function, which explains government responses to a low level of approval. The primary constraint on government behavior is the need to stay in office to be able to pursue its goals. Three instruments of government expenditures are tried as the dependent variable. Explanatory variables include government receipts, the length of time

before elections, Presidential ideology, and the popularity deficit squared. The popularity deficit is the difference between the current level of popularity and that needed to win the next election. While the results of this model were not as strong as for the popularity function, the authors argued that the theoretical hypotheses are not refuted by the evidence. They saw this simple model as a beginning toward more comprehensive models of government behavior.

Finger, Hall, and Nelson proposed that there is a low-track level of decisionmaking in which decisions are made by the bureaucracy according to rules and precedent and a high-track level in which decisions are made by the President. Issues become high track if a great deal of publicity surrounds them, and when they are elevated to the President, they tend to be decided on a political basis. Frey and Schneider further investigated Presidential decisionmaking and support Finger, Hall, and Nelson's conclusion that the process is a political one. They concluded that a President is more likely to decide an issue on the basis of ideology when comfortable with his level of popularity.

Interactions Between Interest Groups and the Bureaucracy. The two articles considered here used rent seeking theory as a basis for analysis. Rent seeking theory sees government restrictions upon economic activity as pervasive and as the source of a variety of rents. The competition by groups to capture these rents is intense and takes many forms, some legal and others illegal. Rent seeking is concerned with the deadweight loss that occurs from groups who expend considerable resources attempting to capture these rents, for their activities do not result in the production of new goods. Early rent seeking work was largely concerned with the effects of quantitative restrictions on international trade and the ramifications of various forms of import licensing. The thrust of this work was that competitive rent seeking for import licenses entails a welfare cost in addition to the cost incurred by limiting imports to the same amount with a tariff (Krueger, 1974).

Rent seeking focuses on power relationships, on the use of power by interest groups to achieve their ends, and on the use of power by officials to stay in office. This analysis includes the role of bureaucrats as holders of substantial power as well. Krueger developed a model of competitive rent seeking with import quantity restrictions. Firms compete for rents through both legal and illegal means, including bribery, corruption, smuggling, and black markets. Her model treated rent seeking as an economic activity toward which the firm devotes a portion of its resources, analogous with production or distribution activities.

Krueger began by discussing the competition for the rents embodied in a given import restriction. To determine if rents are quantitatively important, Krueger analyzed them in India and in Turkey. She found that rents were 7.3 percent of national income in India during 1964 and 15 percent of GNP in Turkey during 1968. As the value of import licenses to the recipients was sizable, competitive rent seeking was expected. Krueger examined the effects of rent seeking by utilizing a basic production and trade model under three scenarios. The welfare effects of (1) free trade, (2) restricted imports without rent seeking, and (3) restricted imports with rent seeking were examined. The country under consideration was small, and this meant that it could not influence the price of its imports.

The trade model includes two goods: food produced for local consumption and trade and imported consumption goods. Labor is the only factor of production and works either in agriculture or in the distribution sector that trades food for consumption goods. In the first scenario, the free trade case, free entry into both sectors equates their wages, and the production outcome is optimal in the sense that the marginal rate of transformation between food consumption and imports is equal to the domestic price ratio.

In the second scenario, the quantity of imports is restricted. Since entry into the distribution sector is limited, its wage increases in comparison with the agricultural sector, and this discrepancy can be considered a rent. The reduced level of imports will reduce the amount of labor employed in the

distribution sector and increase it in agriculture. The final solution indicates that, as food output and domestic consumption of food increase, the price of imports increases and consumption of imports decreases. The solution lies on a lower indifference curve than the free trade solution.

In the third scenario, imports are restricted as in the second case, but now competitive rent seeking occurs. Rent seeking occurs as the comparatively high wages in the distribution sector, resulting from the import quota, have encouraged entry. As labor shifts from the lower paid agricultural sector to the higher paid distributional sector, the amount of agricultural goods produced declines, and as the import quota remains the same, the total amount of goods consumed by the society decreases. Rent seeking entails a welfare loss beyond that generated by the restriction of imports. Results indicated that a tariff is Pareto-superior to quantitative import restrictions accompanied by competitive rent seeking.

Bhagwati (1982) defined directly unproductive profit (DUP) seeking activities as those which use real resources to produce pecuniary returns but do not produce goods or services that increase a utility function. Examples of this kind of activity are lobbying for protection or competing for a share of industrial or import licenses. The use of real resources by these activities results in the contraction of resources available to the economy. The welfare implications of DUP activities depend on whether or not they occur in a situation that is already second best due to existing distortions. In some cases, the DUP activity may be paradoxically welfare improving.

Bhagwati proposed four categories of DUP activities. In categories 1 and 2, a beneficial outcome due to DUP activities is possible, while this is not the case for categories 3 and 4.

Category 1--begins and ends distorted: An example of an illegal DUP activity is smuggling in the face of an existing tariff. A beneficial result may be obtained despite the use of real resources by bringing real production and consumption gains as the effective tariff is cut.

Category 2--begins distorted and ends distortion free: Bhagwati argued that the outcome is the sum of two effects: (a) the welfare effect of the withdrawal of resources into the DUP activity, holding the distortion unchanged; and (b) the welfare effect of the elimination of the distortion in the final solution. An example of a distortion-destroying lobbying activity that leads to socially less desirable outcome is when the resources used to restore free trade are socially more valuable than the gains from free trade.

Category 3--begins distortion free and ends distorted: Here the welfare effect of withdrawing resources is combined with a negative welfare effect from the imposition of the distortion, for a necessarily negative total effect. An example is a successful lobbying effort to create a government-sanctioned monopoly.

Category 4--begins and ends distortion free despite DUP activity: An example of this phenomenon is when the resources expended in tariff seeking by one lobby are offset by tariff-averting lobbying by another group. The end result is that resources are expended but in the end do not affect the free trade policy of the country.

Krueger and Bhagwati investigated the losses that society incurs from the expenditures made by interest groups in pursuit of the rents created by government protection of industries. Like Stigler, they view government protection as creating deadweight losses for society. They discuss the additional loss that occurs when interest groups expend resources to capture the rents created by government policies. While a deadweight loss always occurs in Krueger's analysis, Bhagwati presents a few scenarios where the pursuit of rents is paradoxically welfare improving.

A recent volume presents a substantial compendium of new work on rent seeking from a public choice perspective (Rowley, Tollison, and Tullock, 1988). It attempts to place the work of Krueger and Bhagwati more in the neoclassical stream of thought and emphasizes the apparent differences between the trade-oriented work reviewed here and the traditional public choice literature.

## **The Entire Government**

This section presents work by Allison on how the entire government operates. Allison (1971) proposed three models for the processes, motivations, and goals of government behavior. The first model is in keeping with the idea of the government as a rational decisionmaking agent that seeks to maximize a social welfare function. The second model emphasizes the role of the bureaucracy, and the third emphasizes political bargaining among actors in the government.

### Model 1: The Rational Actor Model

This model assumes that the government is a rational, unitary decisionmaker with one set of goals, one set of perceived options, and a single estimate of the consequences that follow from each alternative. Rationality refers to a consistent, value-maximizing choice within specified constraints and assumes a given payoff function, fixed alternatives, and known consequences. The underlying assumption of this model is that governments pursue goals with actions that maximize their chances of success at achieving those goals.

### Model 2: The Organizational Process Model

In the organizational process model, government behavior is not seen as a deliberate choice but as the output of a large organization functioning according to standard patterns of behavior. The government consists of a group of loosely allied organizations, each with its own concerns and processes. Government leaders sit on top of the organization, and, while they have some control, the behavior of these organizations is primarily determined by routines that were established before the policy question at hand ever arose. The leaders' ability to make decisions is further constrained by the capabilities of the organization. Organizational outputs raise the problem, provide the information, and take the initial steps that color the issue when presented to the organization's leaders. "Presidents rarely, if ever, make decisions--particularly in foreign affairs--in the sense of writing the conclusions on a clean slate.... The basic decisions, which confine the choices, have already been made" (Allison, 1971, p. 79).

### Model 3: Government Politics Model

This model focuses on the fact that each of the leaders sitting on top of an organization is a player in a competitive game. As these leaders share power and have different ideas about what is in the national interest, decisions are made politically. Sometimes one group triumphs, but more frequently the outcome is a result of the mixing of the preferences of all concerned, with a result that differs from what any one group would have anticipated. The individual's impact on decisions depends on his power, defined as a combination of his bargaining advantage and his skill at using it. If a nation performs an action, it is assumed that the action can be understood as the result of bargaining among individuals and groups within its government. Most results emerge from games among players who perceive quite different faces of an issue and who differ markedly in the actions they prefer.

Allison analyzed decisions made about the Cuban missile crisis using each of the three models. With each model, he attempted to explain why the Soviets placed missiles in Cuba, why the United States reacted with the imposition of a naval blockade, and why the Soviets eventually withdrew their missiles. Model 1 focused on the missile problem and on national goals and pressures, and

performed cost-benefit analysis on proposed alternative solutions. Model 1 does not include nuclear war as an alternative, since its end result of mutual suicide is not in the interest of either nation. Model 2 focused on the organizations involved in the decisionmaking process. It was concerned with standard operating procedures regarding organizational information gathering and dissemination, alternative solutions, and implementation of those solutions. Model 3 emphasized the individual leaders who make the decision, not the organizations. This model concentrated on who was involved, political pressures, possible foul-ups, and decision deadlines. Models 2 and 3 acknowledged the possibility of nuclear war by implementation of either standard operating procedures or by the wishes of an individual leader, respectively. Allison did not conclude that one model explained Cuban missile crisis decisions better than the others, but he emphasized that each model examined decisions with different perspectives and assumptions.

Allison's work is useful because it demonstrates that a specific government action can be explained in very different ways, depending upon the conceptual model held by the analyst. This demonstrates the importance of proceeding from facts to models instead of first imposing models on events.

### **Changing Institutions and the Policy Process for Domestic Agriculture**

The next several articles discuss changes in the policy process for U.S. agriculture. Many observers of the policy scene have argued that agriculture has lost the uniqueness that made it acceptable to the American people to provide government programs for its support. The changes that these observers speak of have occurred both within agriculture as a sector of the economy and in agriculture as dealt with in the policy process. These observers contend that assistance to the agricultural sector should have been reduced, and yet farm programs continue largely intact, and their price tag has reached unprecedented levels. Expenditures for U.S. farm programs for 1986, for example, reached \$25 billion. The authors in this section provide different viewpoints on how changes in the sector and in the policy process have affected decisions about agricultural policy. The section concludes with a discussion of recent work on policy formation in Canadian and European Community agriculture.

James Bonnen (1977) argued that the actors involved in policy decisions and their concerns in the 1980's are clearly different from those involved in the origination of farm policies in the 1930's. He traced the changing stakes involved in agriculture and their consequences for the decision process. In the 1930's and 1940's, general farm organizations, including the American Farm Bureau, the National Farmers Union, and the National Council of Farmers Cooperatives were the main spokesmen for farm interests. A triangle of power developed between the farm interest groups, the agricultural committees of the House and Senate, and the program administrators of the USDA. This 'iron triangle' decided upon and implemented policies with little interference from other groups. Bonnen discussed the expansion of the triangle as other actors became involved. He states that in the 1950's the agricultural input and processing agencies became involved in the policy process in a systematic manner, as they recognized the consequences for their industries of supply management and land retirement programs. The crop specialization that grew out of rapid technological change in farming resulted in a splintering of the general farm organizations into single-interest commodity groups. With the significant expansion of U.S. agricultural exports in the 1970's, a whole host of other actors became involved. The political consequences of being a leading exporter during a time of global food shortage brought into the policy arena the Secretary of State, the Secretary of Defense, and various committees dealing with international issues. At the same time, concern over food price inflation brought the Cost of Living Council and the Council for Wage and Price Stability into the picture. Protests over skyrocketing government expenditures were instrumental in the creation of the Office of Management and Budget, and it became one of the key players in the policy arena.

Bonnen argued that the inclusion of so many actors in the decisionmaking process dramatically increased the level of conflict surrounding issues. With an increase in conflict comes the tendency to

elevate the decisionmaking locus from lower to higher levels in the bureaucracy. This shift means that the person making decisions is no longer one who is thoroughly immersed in one field and has a deep knowledge of it but is, by necessity, a generalist who understands the interactions between areas. Bonnen concluded that the result, for a sector as complicated as U.S. agriculture, is a much higher level of decision error.

Infanger, Bailey, and Dyer (1983) discussed the effect of the congressional budget process on the Food and Agriculture Act of 1981. They argue that, while the actual legislation contained in the 1981 Act was only marginally different from the 1977 legislation, the process that produced the two was fundamentally different. Upon taking office, President Reagan's major policy objective was to reduce Federal spending and to obtain a balanced budget. For the agricultural sector, he wanted to reduce the involvement of government, to increase agricultural productivity, and to pursue all objectives at the least possible cost. Although the Congressional Budget Act was passed in 1974, Infanger and others argue that it was a powerful tool for the first time in 1981 because of the political climate.

These authors begin the story of the development of the 1981 farm bill with the passage of budget resolutions ordering large reductions to be built into law by the House and the Senate. This meant that, while considering new legislation, committees also had to consider how to change programs in order to meet required budget cuts. "The very nature of the budget process took policy decisions away from authorizing committees and fiscal decisions away from appropriating committees... Reconciliation fundamentally altered the process of producing a new farm bill" (Infanger, Bailey, and Dyer, 1983, p. 5). The authors conclude that the congressional budget process was in fact creating farm policy. They also predicted that food and farm programs of an entitlement nature would be reduced to free funds for other nonentitlement programs. Finally, they ended by stating, "Paarlberg is right--agriculture is losing its uniqueness. USDA programs will be treated by Congress like other programs of a similar nature. The budget process represents another substantial erosion in the ability of agricultural interests to control the farm and food agenda in the 1980's" (Infanger, Bailey, and Dyer, 1983, p. 9).

Shepsle and Weingast (1986) argued that the fashionable tendency to place blame for the excesses of government on the executive branch is wrong. They pointed to Congress as the responsible party and examined the institutional changes that have led to what they see as the decline of Congress as a whole and the rise of irresponsible subcommittees. The decline of political parties in the postwar era coincided with the increased ability of members of Congress to finance their campaigns from other sources. Freed from party discipline, the legislators were able to concentrate on activities that would benefit their own particular constituency and ensure their reelection. Other institutional changes have reduced the effectiveness of the once-powerful House Rules and Appropriations Committees. These committees acted as a brake on excesses of interest groups and guarded the Nation's purse. Of primary importance are the procedural changes following the 1973 Subcommittee Bill of Rights. This bill fixed subcommittee jurisdiction, provided for automatic referral of bills to committees, guaranteed budgets and staffs for subcommittees, and formalized the bidding process for subcommittee assignments.

In a recent article, Hardin (1986) examined the consequences of these changes for agricultural legislation. The subcommittees are portrayed as being extremely powerful, focused on narrow issues, and with a membership that has a vested interest in the enactment of government programs. These conditions have increased the access of legislators to single-interest commodity groups. The presence in Washington of such groups has increased simply because they have discovered that lobbying works in this environment. Thus, the culmination of institutional changes has meant that there is no effective brake on the provision of legislation favorable to the concerns of interest groups. While attempts have been made to address this issue, Hardin argued that they have been ineffective, and they have

missed the mark. Using sunset legislation to require a periodic evaluation of programs or bills to require a balanced budget will not bring governmental excesses under control. He suggested that appropriate actions include a return of power to the House Rules and Appropriations Committees, a strengthening of the Congressional Budget Act, more effective integration of the President into the legislative process, and the amending of the Subcommittee Bill of Rights.

Schick (1983) argued that Congress is ineffective because current economic conditions demand that it play a role incompatible both with the public expectations and with the institutional structure that has evolved over the years. He traced the evolution of Congress during the history of the United States, paying particular attention to the rapid changes in attitudes and structure that occurred during the New Deal era and during the period of prosperity following World War II.

Schick distinguished between distributive and redistributive legislation. Distributive legislation is financed by economic growth and, while making some people better off, it makes no one worse off. Redistributive legislation is financed by tax increases and involves transfers between people. Schick argued that Congressmembers have always been in favor of distributive policies that would benefit their geographical electorate. This tendency was held in check by a strong belief in limited government and balanced budgets until the 1930's. The New Deal was the beginning of a revolution that enlarged the role of government and changed the expectations of citizens. This occurred about the time when Keynesian economics started to change attitudes about balanced budgets. Schick argued that, while the New Deal paved the way for substantial changes, it did not radically alter Congress or society's opinions about the congressional role. Not only do new ideas take time to develop, but the New Deal was not a complete success for everyone who lived through it, and the level of unemployment remained high.

Only with the full employment that occurred with World War II did the population begin to accept the enlarged role of government as permanent. With postwar prosperity, Congress had the means, but not yet the desire, to engage fully in redistributive policymaking. The House Appropriations Committee believed that its goal was to cut the President's budget. The House Ways and Means Committee stifled demands for tax increases by making it procedurally difficult to discuss the legislation. The enlargement of programs occurred in an incremental, steady, and piecemeal fashion. Enlarged budgets for government agencies every year came to be expected and was a way of reducing political conflict. Economic growth was vigorous enough to enable Congress to enact programs to subsidize major segments of the population without raising taxes or conflicting visibly with other interests.

A series of institutional changes, many discussed by Clifford Hardin, occurred to make Congress more open and responsive to outside interests. The opening up of Congress occurred during a transition when the Federal budget was being transformed from a source of funding for Federal agencies to a source of funding for special-interest groups. The major point made by Schick is that the institutional changes which were needed to make Congress a redistributive body occurred slowly and followed the economic growth that made it possible, although with a considerable timelag. Once the transformation of Congress into a redistributive body was complete, Congress found that economic downturns have meant that the resources are no longer there to redistribute without conflict.

The first two articles in this section discussed changes in the policy process that have made it difficult for agricultural producers to continue to obtain the policies and economic support that they desire. Bonnen discussed the breakdown of the iron triangle with the inclusion of other interest groups into the agricultural policy process. Infanger, Bailey, and Dyer explained how concerns with reducing the level of spending and the Budget Reconciliation Act shaped the 1981 farm bill. The other side of the picture is painted by Clifford Hardin, Shepsle and Weingast, and Schick, who trace the institutional changes in Congress that have made it easier for interest groups to influence congressional behavior,

particularly at the subcommittee level. Clifford Hardin emphasizes the increased power of the subcommittee and the ability of well-financed and well-informed single-interest commodity groups to influence them. Schick's view is a broader one that traces the historical evolution of Congress into a redistributive body. Can sense be made out of these two opposing arguments about agricultural policymaking?

The first part of the answer lies in the identification of the issue to be resolved. With the increasing involvement of the agricultural sector in the export market, some issues have come to be decided by the White House. However, Congress still controls agricultural legislation, which determines domestic farm programs with their international market and foreign policy consequences. And Congress has rejected White House proposals for farm legislation firmly and early in the policy debate for the last two farm bills.

Also, as the process of agricultural policymaking has become more complex with the inclusion of a wider range of players, agricultural commodity groups have become more sophisticated in their approach and more adept at gaining the ear of the right person. Despite the presence in Washington of agricultural input groups and other food-related concerns, there is a lack of consensus about their effectiveness. Browne argues that Congress is not truly receptive to all interest groups' concerns about the farm bill. "The most damaging myth, however, was the mistaken belief that the 1985 farm bill was open to everyone's participation. In theory, anyone can gain the ear of Congress. In practice, they cannot. Agribusiness encountered the widespread Congressional opinion that this was a farmers' bill and that producer groups held the most legitimacy. This opinion solidified after the farm crisis came to a forefront, but it is decades old" (Browne, 1986, p. 14).

This argument emphasizes that farmers still have tremendous power in Congress over the omnibus farm bill process, despite the complexity of the process or the recognized need to cut expenditures. Office of Management and Budget (OMB) Director Stockman recognized this power after he attempted to make massive reductions in expenditures. "I don't believe in this momentum theorem anymore," he said, "I believe in institutional inertia. Two months of response can't beat down fifteen years of institutional infrastructure. I'm talking about K Street and all the interest groups in this town, the community of interest groups. We sort of stunned it, but it went underground for the winter. It will be back." (Greider, 1981, p. 51).

In addition, several recent works have addressed the interaction of interest groups and governments in the formation of agricultural policy in other developed countries. They are noted here to emphasize the growing interest in understanding the process of agricultural policy formation.

Skogstad (1987) has completed a major study entitled The Politics of Agricultural Policy-Making in Canada. Focusing on three case studies--price stabilization, marketing boards and supply management, and transportation subsidization (Crow Rates)--she documents the interactions among provincial and Federal governments and interest groups. The form of constitutional sharing of responsibilities is judged to be important to the form of policy that emerges. Stabilization policy has had both Federal and provincial involvement, marketing policy has been predominantly a provincial matter, and transport policy a dominantly Federal activity. Interest groups interact differently with more localized levels of government than they do with the national government.

Petit (1985) did a comparative study of French and U.S. agricultural policies and then focused on a case study of dairy policy in the United States. Petit's basic hypothesis is that, while longrun economic trends shape and guide the basic form of policy, it is political interaction among interest groups, Congress, and bureaucrats that determine the short-term values of policy parameters. It was an economic crisis of the 1930's that shaped the basic form of U.S. policy, but it is political tradeoffs that determine the level of milk price support in a given year. A subsequent study led by Petit (Petit,

de Benedictis, Britton, de Groot, Henrichsmeyer, and Lechi, 1987) studied in detail the 1984 milk policy decisions in the European Community. Looking at three levels of activities--interest groups with national governments, among national governments, and at the Community level--a fascinating story is told where politics, conditioned by economic constraints, shaped a modest but important revision of policy.

There are also increasing efforts to characterize the nature and causes of political intervention in the agriculture of developed countries. Miller's (1986) work focuses on the apparent political causes of domestic intervention and the possible ways out of competitive increases in trade distortions that result from domestic policy. Anderson and Hayami (1986) propose a set of interrelated hypotheses as to why agricultural protection increases with development. The principal cause is claimed to be the declining comparative advantage of agriculture which causes a decline in agricultural incomes in the absence of intervention. The second cause is that development involves a diminished relative and absolute size of agriculture, which enhances, *à la* Olson (1965), the capacity of small groups to obtain political intervention in their interests. Finally, Winters (1987) argues that interactions between farm lobbies on the demand side and bureaucrats and politicians on the supply side lead to intervention, thus supporting the claim that the agricultural sector is of unique importance to a developed country.

## **Conclusions**

The above partial and incomplete review of the growing literature on domestic policy formation yields no clear consensus on explanations of how policy is formed. The common thread is that decisionmakers, interest groups, and bureaucrats pursue their own maximization calculus rather than maximizing some notion of a social welfare function. But, beyond this, conceptual models are highly varied in terms of what variables are hypothesized to be critical in influencing outcomes. Similarly, the scattered empirical evidence is often conflicting as to why actors in the process do what they do. The final section on agricultural policymaking is somewhat more pragmatic, with most authors arguing for a complex set of interactions among interest groups, bureaucrats, and politicians that is influenced by short-term political considerations but constrained by long-term economic reality.

The basic conclusion that must be reached is that domestic public policy is the product of a continuing process of self-interested interaction among a set of players where political and economic issues are inextricably intertwined. This means that rational public policy analysis necessarily must include the policy process as an endogenous part of economic policy analysis. The basic question still to be settled is how best to accomplish that end. To date, the literature offers an increasingly rich menu from which one may choose, based on the analysts' particular preconceptions of what actors and variables are important to the policy issue being studied. Public choice theory, in its broadest context, has forced economists to reconsider the classical view that economic policy analysis can be objectively formulated, but it has not produced a comprehensive body of thought to guide the analyst on how to include the policy process in the analysis.

## **International Trade Interactions**

Most commodity markets are heavily concentrated and are subject to extensive government intervention. This means that the national policies adopted by one country often affect other countries through trade. Because of this interdependence, governments tend to respond to the actions taken by other governments. An important issue in international trade is the level of subsidization given by countries to their producers. Both the instruments used and their level of implementation differ greatly by country. This has caused tension between governments who accuse each other of unfair trade practices. Formal institutions such as the General Agreement on Tariffs and Trade (GATT) govern the negotiations among countries and provide trading rules.

These realities have motivated economists to extend the neoclassical trade model and to incorporate new tools. We begin by summarizing the neoclassical trade model, evaluating its underlying assumptions and explanatory power. Using it as a point of reference, we introduce models that relax the neoclassical assumptions and introduce dynamics. The categorization scheme is not strictly chronological. It is organized around the idea of moving from a partial to a general equilibrium analysis of trade as more of the variables that affect trade are included in the analysis.

### **The Small Country Model**

The neoclassical trade model is a static analysis that rests on two important assumptions: (1) that countries take the price of goods as exogenously given; and (2) that there is no government intervention in the marketplace. The first assumption indicates that a country is small in a manner that parallels the firm in perfect competition. The country's actions as a buyer or seller do not affect the price of the good in the international marketplace, and so price is taken as an exogenous variable in the country's maximization problem. The second assumption is that the government does not intervene by promoting exports through domestic price supports or input subsidies, nor does it intervene at the border through tariffs or quotas. In the Heckscher-Ohlin Model, trade occurs according to each country's comparative advantage. If combined with the assumptions outlined above, the free trade that results is a Pareto optimum. This analysis is static and evaluates trade and its effect on a country at a point in time. In summary, the country's maximization problem is to choose the quantity of trade to maximize its national welfare, given exogenously determined international prices. Many textbooks provide an excellent explanation of the neoclassical model (Grennes, 1984; Lindert and Kindleberger, 1982).

### **The Large Country Model**

The recognition that a high degree of concentration exists in commodity markets has led to the development of the distinction between the "small" and "large" country cases of international trade. The distinction here is not necessarily one of a country's size. It is made on the country's ability to export large enough quantities of the commodity to affect the world market price. In analytic terms, the exporting country faces a downward sloping demand curve in the same fashion that a monopolistic or oligopolistic firm does. With the recognition that it is large enough to influence the market, a government may try to use this power to enact trade policies to enhance national welfare. This is the paradox of world trade, for while global welfare is maximized if all countries practice free trade, it is in each large country's interest to try to reap the gains of protectionism.

Evaluation of imperfect markets is important because of the potential economic power held by large actors in the marketplace. Interest in the field increased after the successful formation of OPEC. Agricultural trade is dominated by a few large exporters of the basic commodities of wheat, feed grains, and soybeans. The fear of food shortages in the 1970's reinforced the potential market and the political power of large-country exporters. Some countries expressed interest in the formation of an international wheat cartel as a method of increasing exporter profits. This section examines the implications of being a large-country actor and traces the development of analyses of imperfect markets.

Enke (1944) wrote a classic article on the argument for an optimum tariff. This argument states that when a country is large in a given market, its domestic producers can benefit from the imposition of a tariff. This is only true in the absence of retaliation by other countries. However, tariffs are not the only policy instruments of interest. A wide variety of policy instruments may be used, depending upon the country's specific goals, its size in the market, and its existing trade relationships and agreements. The articles considered below investigate how the effect of policy instruments varies with the type of market, and they examine optimal policies under different circumstances. To do this,

a number of different models are employed. Some of these models treat the policy variables as exogenous. This means that the effect of the policies on trade flows is recognized by the model. However, these models do not explain the determinants of the policies or the relationship between the consequences of past policies and the formation of future policies.

In summary, these models portray the country as solving a maximization problem with the same objective as the neoclassical model (the maximization of national welfare) by choosing the optimal level of trade. The difference is that the constraint now includes exogenously given domestic policy and border instruments as well as the price. The Grains-Oilseed-Livestock (GOL) Model developed by Rojko and others (1978) for USDA is an example of this framework. Thompson (1981) extensively reviewed one- and two-region models and nonspatial price equilibrium models of this type. Thompson states that the results of two-region models differ on the magnitude of the price elasticity of export demand, their most important parameter. While nonspatial price equilibrium models offer many improvements, he argued that inadequate data and improper estimation techniques render many of the estimated parameters suspect. Thompson continued the review by considering models of spatial price equilibrium and trade flows and of market share. He assessed their contributions and limitations, which include the difficulty in duplicating actual trade flows.

We now extend the large-country model in two important ways. First, we discuss models that recognize that it is inappropriate to assume a competitive market structure. Recognizing that concentration exists in many commodity markets, the authors examine the behavior of the market to determine which model of imperfect competition is appropriate. Second, these models build on the analysis described in the previous section by endogenizing the policy variables that have a significant effect on trade. This important extension recognizes that governments could choose instruments to achieve optimal intervention.

### Imperfect Market Models

McCalla (1966) proposed to model the world wheat market in the late 1950's and early 1960's as a duopoly, with Canada as a Stackleberg leader, the United States as a follower, and Argentina, France, and Australia acting as a competitive fringe. Canada and the United States supplied 60 percent of the market and were the only countries with sufficient storage capacity to practice oligopolistic pricing policies. While six importers accounted for half of the wheat sold, McCalla justified modeling the buyer's side as competitive because no one country could exert market power. In his analysis, McCalla argued that Canada acted as an accepted leader in cooperation with the follower, the United States. He explored facets of U.S. domestic and foreign policy that explain why the United States would choose to act as a follower despite its productive capacity. McCalla employed standard monopoly analysis to graphically define an "area of cooperation," an area of prices and quantities that were acceptable to both countries. McCalla speculated that Canada and the United States might engage in a price war with Australia, whose increasing market share was upsetting the duopoly. Their purpose would be to force Australia into joining a triopoly. This, and subsequent work on these questions, is reviewed in McCalla and Josling (1981). Alaouze, Watson, and Sturgess (1978) argued that the transition from a duopoly to a triopoly did, in fact, occur. They generalized the model proposed by McCalla and demonstrated how a stable triopoly could operate.

Carter and Schmitz (1979) challenged the idea that price formation in the world wheat market is largely determined by the exporters. They used an "optimal tariff" framework to examine the potential surplus-importing countries could gain from acting as monopsonists (the market condition that exists with only a single buyer). When countries act as monopsonists, imports are reduced, and the gain in tariff revenue and producer surplus more than offsets the consumer loss. The authors tested the hypothesis that importers have exerted monopsony power in the wheat market by comparing actual prices with empirical estimates of the optimal tariff solution. Their results led to the

conclusion that the European Community and Japan could be tacitly colluding with one acting as a price setter while setting tariffs that are close to the theoretical optimum. This indicates that importing countries could be appropriating a substantial welfare gain.

Karp and McCalla (1983) continued this line of investigation in their work on interactions between buyers and sellers in the world corn market. The dynamic model that they used indicates that the welfare gain from the imposition of optimal taxes is less than previously indicated in static solutions. This work is discussed in more detail in a later section of the review, on dynamic games.

Just, Schmitz, and Zilberman (1979) examined price controls and optimal export taxes under alternative market structures. They argued that international trade normally takes place between institutions, both public and private, who act as intermediaries between competitive producers and consumers. In their model, international trading companies exercise market power, and the government attempts to maximize domestic social welfare through the imposition of tariffs and other trade barriers. These authors' main concern was to analyze the welfare effects of trading companies who exercise both monopoly and monopsony power. Beginning with the free trade case, the optimal conditions for an individual country selling a single good are reviewed. Using that as a point of departure, the monopoly-monopsony case and the case of producer cartels are analyzed. The authors concluded that, if international marketing institutions exert power that results in noncompetitive pricing, then domestic price controls alone cannot ensure an optimal allocation of resources. They suggested that additional controls are needed and recommended an export tax to accompany marketing boards and an export subsidy in the monopoly-monopsony case.

Paarlberg (1980) reviewed several theoretical models of imperfect markets. His purpose was to demonstrate that the assumption of market structure is critical in evaluating the effect of policy changes on welfare gains and market equilibrium. He stressed the need first to examine the structure of the market and then to perform the analysis, using the appropriate tools instead of assuming a competitive market form by default. Paarlberg examined variations on models of free trade, monopoly-monopsony, duopoly, triopoly, and countervailing power.

Jabara and Thompson (1982) introduced risk into an optimum tariff model for the small-country case. Standard neoclassical results for the small-country case indicate that its optimal strategy is free trade. With the introduction of uncertainty in the form of variable commodity prices, the optimum strategy is for a tariff that raises the price of the imported commodities relative to exported ones, encouraging a movement toward self-sufficiency.

Sarris and Freebairn (1983) investigated the effects of domestic price policies on the world price of wheat, examining both its level and its stability. They modeled the world wheat market as a Cournot oligopoly in which the world price is determined by the interaction of all countries' excess supply and demand curves. The domestic optimization problem involves the choice by the government of a differential between domestic and international prices. The objective function embodies the weighting given to the welfare of producers, consumers, and the government treasury. A producer price maintained above world levels indicates that producers are accorded a higher weight than either consumers or the government treasury. A variable indicating a preference for price stability is also included.

Sarris and Freebairn used the country groups and parameter estimates from the GOL model in the application of their oligopoly model. Simulation of global free trade practices resulted in a world price 11 percent above the existing price level and indicated a 35-percent decline in price variability. Then the effect of regional liberalization was estimated. The elimination of EC policies alone resulted in a 9.2-percent price increase and 19.8-percent decline in price variability.

All the articles in this section are concerned with the effect of market power on trade. McCalla, Alaouze, Watson and Struggess, and Carter and Schmitz explored price setting and market power in the world wheat market. Paarlberg argued that the correct market structure must be ascertained before attempting to evaluate the effect of government policies. He examined the effect of a number of policies on different market forms using a graphical analysis, and Sarris and Freebairn estimated the effect of government policies econometrically. Jabara and Thompson and Just, Schmitz, and Zilberman were concerned with assessing optimal government policies.

A significant new literature has emerged that relaxes some critical assumptions in the neoclassical trade model. This literature is based on the empirical observation that an increasing proportion of world trade is intraindustry rather than interindustry as would be predicted by traditional comparative advantage models. If the assumptions of product homogeneity and constant returns to scale are relaxed, a theoretical model that explains two-way trade in like products can be developed (Krugman, 1987, and Helpman, 1984). The model developed is not unlike the Chamberlinian large-group model applied to international trade.

A second variant of the "New Trade Theory" has dealt with the relaxation of the small-country assumption. This theory involves large countries and large traders dealing in homogeneous products (Spencer and Brander, 1983, and Brander and Spencer, 1984). These models lead to strategic trade policies where intervention improves a country's welfare.

Thursby (1987) investigated the use of strategic trade policy when a homogeneous product is produced competitively but is sold in an imperfect market. She argued that the use of strategic power by marketing boards has been neglected in the new strategic trade literature but that the prevalence of government trading agencies makes this important to consider. The model she used has the following features. A homogeneous good is exported by two countries to a third country. The good is competitively produced and is sold to a single marketing agent, which is a private monopolist in the home country and is a statutory marketing board in the foreign country. The private monopolist maximizes profits, while the board maximizes the joint returns of all producers. The governments can precommit to policies to give their agents a strategic advantage; this means that the governments play a Stackelberg game against the marketing agencies and a Nash game against the rival governments, and the marketing agencies play a Nash game with the government policies as given. Thursby wants to know if export subsidies can be welfare improving in this situation.

Thursby examined three scenarios: (1) an unregulated marketing board and monopoly-monopsony; (2) a regulated marketing board and monopoly-monopsony; and (3) a quasi-competitive home market. Thursby concluded that governments who create marketing boards may or may not want to subsidize exports, depending on whether or not they are regulated. Secondly, she argues that governments with a private marketing system would subsidize exports only when the exports are marketed by a monopolist. Thursby noted that agricultural export subsidies exist in many cases when the private marketing system is composed of many firms and concluded that an explanation based on political economy may be appropriate.

Grossman and Richardson (1984) reviewed the literature on trade policy for oligopolistic markets. They discussed how governments can set policy to capture a larger share of the supernormal profits in global oligopolistic industries and stated that the ability to give credible government policy precommitments gives home country oligopolistic firms a global advantage. Finally, they explored issues of economies of scale and imperfect information in oligopolistic markets.

These new theories of trade have not yet, with the exception of the work of Thursby, been used extensively to analyze agricultural trade. That possibility seems an attractive way to proceed.

## Reaction Functions

Many of the models already discussed implicitly recognize that trade occurs in an interdependent world and that governments recognize that other countries may respond to the imposition of trade barriers by policy choices of their own. Thus, a country's maximization problem becomes more complex. The country still seeks to maximize national welfare and thus, in the model, must choose both the levels of trade and of relevant policy variables. With recognition of an interdependent world, the constraint becomes more complex because both domestic and foreign country policy variables are relevant.

Models incorporate this interaction between domestic policies in reaction functions. A country's reaction function recognizes that its optimal output level depends on the level of output chosen by its competitors, and the reaction function specifies this relationship. The slope of the reaction function is the rate at which the country's profit-maximizing output will change with a change in its rival's output. Traditionally, oligopoly theory has utilized reaction functions for firms, and the factors of concern have been price and quantity. Recent work has extended this concept to include policy instruments such as tariffs.

Carter and Schmitz (1979) implicitly assumed a Cournot-Nash reaction function. In this case, a country enacts policies under the assumption that other countries involved in the same market will not react. This is a naive assumption that allowed for a simple analysis, but it neglected the strategic interplay of trade relations.

McCalla (1966), in his duopoly model of world wheat trade, used a Stackelberg model with Canada as the leader and the United States as the follower. While in the Cournot model each country takes the others' actions as given, in the Stackelberg model they take each other's reactions as given. As previously discussed, McCalla defined "an area of cooperation" for the two, and he discussed the informal arrangements that existed to keep the price of wheat within the area of cooperation. McCalla speculated that, if a mutually acceptable scheme ceased to exist, economic warfare would ensue.

## Introduction to Conjectural Variations

Increasing levels of sophistication are introduced into the concept of reaction functions as models attempt to incorporate the strategic interplay between countries. Countries anticipate response or retaliation to their actions. They recognize that this anticipated response must be considered in the formulation of their optimal policy. If this is not done, the response from their trading partners could reduce the effectiveness of the policies that they enacted. As a country does not know the reaction function of its competitors, it is forced to make conjectures about it. These speculations are called conjectural variations. One assumption previously examined was the Cournot assumption of zero conjectural variations, which implies that the conjectural variation function is horizontal, that is, that there is no reaction. We have already considered models where the discussion of the reaction function is qualitative, and we will now proceed to studies that are concerned with quantifying it and examining the ramifications of various assumptions.

Jensen and Thursby (1983) viewed as inadequate the usual approach to finding tariff equilibria by making Cournot or Stackelberg assumptions. These assumptions consist of the belief by one or both of the countries in a two-country model that they can change their tariff without retaliation on the part of the other country. These authors proposed to include the expectation of retaliation into a model of tariff equilibria. They believed that this more general approach would allow analysis of how tariff equilibria differ when different levels of retaliation are expected. They use a two-country (A, B), two-good (x, y), model where country A imposes tariff  $t_y$  on the importation of y from country B. In

order to solve its maximization problem, country A must make a conjecture about the form of country B's retaliation to the imposition of a tariff. Country A will expect B to retaliate by changing tax  $t_x$  in such a way that the resulting change in  $t_x$  will equal a constant proportion of the percentage change in the terms of trade induced by country A's change in  $t_y$ . Country B is assumed to do the same, and so the conjectures are symmetric by assumption and keep the terms of trade constant. Using this framework, Thursby and Jensen developed two propositions:

1. If either country's conjecture regarding foreign retaliation increases in magnitude, then that country's equilibrium tariff will decrease.
2. If both country's conjectures regarding foreign retaliation increase in magnitude, at least one country's equilibrium tariff will decrease.

This approach to tariff formation concludes that an equilibrium is characterized by the lack of incentive for country A to change its tariff from  $t_y^*$  (where  $*$  denotes the equilibrium tariff) because it expects country B to retaliate to any changes to such an extent that its utility could not increase.

Bresnahan (1981) proposed to extend the rationality of the Nash equilibrium by imposing consistency of conjectures. A conjectural variation is firm A's conjecture about the behavior of firm B, and a reaction function is firm B's actual behavior. If consistent, the conjecture equals actual behavior. In equilibrium situations, two conditions about the conjectures hold. First, each firm will be correct in their prediction of the level of the other's actions. Secondly, they will also be correct about the nature of the function that produced the action.

Kamien and Schwartz (1983) advanced several objections to the assumption that firms in imperfect markets do not hold conjectural variations. These authors show that the market share of each firm depends on the beliefs of all the firms in the market. Specifically, they demonstrate that a firm's market share varies inversely with its own conjectural variation and directly with the conjectural variation of its rivals. They conclude that the more responsive to their actions such firms believe that the industry is and the more homogeneous the beliefs held by the firms, the smaller that industry's output will be. For example, a firm that believes that other firms will increase output in response to its own increase in output may refrain from such an increase. If this belief is held by all firms in the industry, a smaller total output will be produced.

This work is relevant to the questions considered in this review, since it is easy to consider countries in place of firms and the total world production as equivalent to the industry output. With this analogy in mind, Kamien and Schwartz's results have implications about the determination of market structure and for the role of conjectural variations in determining market outcomes.

Hong Hwang (1984) investigated the effect of intraindustry trade with oligopolistic firms using a conjectural variations approach. The assumption of Cournot behavior is dropped in favor of equal conjectural variations, that is, each firm anticipates that its actions will call forth a response from its rivals. Letting the value of the conjectural variation,  $a$ , equal the following values:  $a=-1$ ,  $a=0$  and  $a=1$ , leads to the competitive, Cournot, and joint profit equilibria, respectively. Hwang used a two-country model with each country having one firm that produces a single identical good for his examination of the conditions under which trade will occur. Results indicated that under free trade each firm would export to the other's market if the difference between the perceived marginal revenue and marginal costs exceeded the transport cost per unit of good. An increase in transport costs would decrease the level of intraindustry trade.

Hwang evaluated the welfare effect of intraindustry trade. In general, trade provides the possibility of welfare increases if it increases competition and, therefore, reduces equilibrium prices. Results of

this model indicated that this possibility is negated if firms play collusive strategies, for example, if  $a$  is greater than 0, even if only slightly. Only when  $a = 0$ , indicating Cournot behavior, are consumers better off with intraindustry trade. It is not imperfect competition alone that produces the possibility of losses from trade but the combination of imperfect competition and transport costs. Firms are worse off in these cases than they were when they were earning monopoly profits. Hwang then examined the effect of including the effect of a firm's conjectural variation on export retaliation. This is the conjecture that firm I makes on whether or not firm J will retaliate to an increase in I's exports. An increase in the degree of retaliation expected decreased the degree of intraindustry trade and increased the equilibrium price. Hwang concluded by stressing the welfare gains realized from free trade. He suggested that if firms in the industry play collusive strategies or anticipate export retaliation it may be undesirable to create a free trade environment without first subjecting the firms to antitrust provisions.

All of the articles above investigate how the incorporation of conjectural variations influences the decisions of an agent and alters market outcomes. Jensen and Thursby examined this question with countries as the actors and tariffs as the action under consideration. Bresnahan, Kamien and Schwartz, and Hong Hwang were concerned with actions taken by firms, and they examined the influence of conjectural variations on the level of industry output and trade.

### **Estimation of Conjectural Variations**

Most previous work has made simplifying assumptions about the form of the conjectural variation included in a country's or a firm's maximization problem. Jensen and Thursby assumed symmetric conjectural variations that would keep the terms of trade constant. Hong Hwang discussed the conjectures that imply various market forms without giving guidance about how to choose the most appropriate form. The usefulness of a conjecture depends directly on its accuracy. It consists of an informed guess about how country B, which is competing in the marketplace, will respond to a change of output by country A. This requires knowledge of country B's political process: about the welfare goals it holds for producers and consumers and how it goes about achieving these goals. It also requires an understanding of the effect of B's intervention decision on the world market price and how this feeds back into its success in achieving its welfare goals. It appears that little work has been done to date on estimating conjectural variations for countries. Estimation of the conjectural variations held by trading partners would be a useful subject for future research.

### **Game Theory Applications in Trade**

The concept of game theory applications has proved to be a fruitful one for a number of observers.

#### **Repeated Static Games**

Trade relationships are a series of strategic interactions through time as each country tries to achieve its goals, while maintaining beneficial trading relationships. This sort of problem has been usefully modeled with game theory, which, generally stated, is the study of cooperation and conflict between individuals acting in situations of uncertainty. "While an individual can benefit from mutual cooperation, each one can do even better by exploiting the cooperative efforts of others. Over a period of time, the same individuals may interact again, allowing for complex patterns of strategic interaction" (Axelrod, 1984, p. 92). Another reason for considering the use of game theory as an analytical tool is that if more than one country is setting policy based on the responses of its trading partners then the excess supply and demand functions are not uniquely determined. Game theory provides alternative models of analysis for these situations. Von Neumann and Morgenstern (1953) introduced game theory in economic analysis with their classic work, The Theory of Games and Economic Behavior. Our purpose here is not to review the development of game theory with its

wide-ranging applications, since this has been done elsewhere (Schotter and Schwodiauer, 1980). Our discussion is limited to the aspects that are useful in modeling the sequential interactions of countries through trade, including theories of strategy and negotiation. We begin with games that are iterative and end with a fully dynamic application.

A game is described in terms of the players, the rules and the payoff matrix of the game, and the information conditions in effect. A player is the person or group that acts as a decisionmaking unit. The rules specify the options open to the player. A strategy is a complete specification of what a player will do under each contingency possible in the game. The payoff matrix is the utility associated with the outcome that occurs due to the choice of strategies on the part of the players. In a cooperative game, the players can communicate with each other and make binding agreements about how to coordinate their actions. In a noncooperative game the possibility of communication and coordination are ruled out. Nash (1953) was one of the first to investigate the role of threats in two-person noncooperative games.

The prisoners' dilemma is a game that illustrates the dilemma of cooperation under uncertainty. Prisoners, partners in crime, are separated in prison cells and are unable to communicate with each other. Each prisoner has the choice of cooperating by remaining silent or turning state's evidence in order to receive a light sentence. Examination of the payoff matrix (fig. 3) reveals the dilemma, for

Figure 3  
The prison's dilemma

		Column player	
		Cooperate	Defect
Row player	Cooperate	R=3, R=3 Reward (R) for mutual cooperation	S=0, T=5 Sucker's (S) payoff, and temptation (T) to defect
	Defect	T=5, S=0 Temptation to defect and sucker's payoff	P=1, P=1 Punishment (P) for mutual defection

Note: The payoffs to the row chooser are listed first.  
Source: Axelrod (1984).

the dominant strategy for each is to defect in order to avoid being the "sucker," and the outcome of mutual defection is Pareto inferior to cooperation.

Shubik (1984) presented a game-theoretic approach to the problems of political economy. He discussed the special role that money and commodities play in distinguishing economic problems from other problems of multiperson decisionmaking. His previous book (1982), Game Theory in the Social Sciences: Concepts and Solutions, is a companion volume that presented the concepts and solutions utilized in the theory but which are applicable to a much wider range of problems.

Grossman and Richardson (1984) reviewed the literature on response and counterresponse in a strategic trade policy environment. Beginning with Johnson's (1953-54) classic work on optimum tariff retaliation, they traced the development of these concepts by Mayer (1981) and Jensen and Thursby (1983).

Jensen and Thursby (1983) modeled trade as a prisoner's dilemma to examine the conditions under which free trade will emerge as a noncooperative equilibrium outcome of an optimum tariff model. They used a "super game" to analyze the interactions of countries through time. A super game is simply a static game played a specified number of times. The conditions and choices facing the players remain constant with each repetition. Thursby and Jensen examined the possibility of unrestricted trade in a model where countries mutually recognize the incentives of each other to impose tariffs and to retaliate to their imposition by others. They evaluated how this recognition affects the tariff equilibrium that results and the need for negotiations.

Beginning with the standard two-country model, an assumption of constant elasticity offer curves is made so that each country's unique tariff optimum is given by  $t = 1/(n_j - 1)$  (where  $n_j$  = elasticity of  $j$ 's offer curve.) Thursby and Jensen used a single-period prisoner's dilemma game to demonstrate that free trade, despite its Pareto superiority, is unobtainable under standard neoclassical assumptions. In this analysis, free trade is the cooperative strategy and the optimum tariff is the noncooperative strategy. However, with a repetition of the single-period game, the higher potential gains from free trade and the knowledge that the foreign country will retaliate to the imposition of a tariff produces different results. As the gains from free trade are higher, each country has an incentive to signal its willingness to cooperate by adopting the free trade policy. Two reasonable approaches for a country to follow are to impose a zero tariff as long as the foreign country does so (Tit-for-Tat Strategy) or for no longer than  $k$  periods (where  $k = 0, 1, 2, \dots, T$  is a predetermined number of periods). Once either country has imposed a nonzero tariff, it is in the interest of both countries to levy a nonzero tariff in the remaining periods. Thursby and Jensen proved that under these conditions the unique Nash equilibrium rules out either country from ever adopting a free trade policy.

However, with small modifications to the framework, they showed that free trade is a possibility. The first modification is for the discounted gains from countries imposing their optimum tariffs to be insignificantly small. If a country is willing to forego the gain from imposing a tariff in period  $T-1$ , then the entire process does not unravel. Examining conditions of imperfect information, the authors concluded that a sufficient condition for both countries to adopt a free trade policy is for each to believe that the other will do so as well.

### Other Interactive Approaches

The following article was included because of its potential usefulness in thinking about the relationships between actors on the international, national, and commodity sector levels. Batten (1983) proposed that international trade can be modeled as a hierarchical, multilevel system of exchange. The macrolevel encompasses decisions by international exchange authorities on trade or tariff policies. The mesolevel is constrained by the global policies enacted at the macrolevel and is

concerned with subsystems of industries, trade unions, transnational firms, and national authorities, each with their own objectives. The microlevel encompasses individual traders. Batten's goal was to develop a multilevel programming model flexible enough to incorporate:

1. Conflicting objectives, both within and among levels;
2. The use of both qualitative and quantitative information; and
3. Multistage decisionmaking that models the compromises and learning that occur over time.

The basic multilevel system has a number of actors, each with its own objectives, decision variables, and constraints. A set of relational constraints define the action space of each decisionmaker. These relational constraints may be, but are not limited to, technical, economic, or institutional constraints. They may be internal or joint constraints which limit their relations with other actors. Only with joint constraints is there a need for an international authority. The international authority and the subsystems prioritize their goals. Then they determine a minimally acceptable achievement level so that each goal can be expressed in the form of an achievement constraint. A distance metric can be used to calculate the difference between any compromise and the ideal solution; this forms the basis of the objective function.

In the iterations that result between the subsystem and the center, the subsystems learn that they must consider the competing interests of other subsystems. Batten then formulated the problem as a multistage process in which conflicts are resolved through time. While complicating the analysis, this factor allows for more realistic trajectories of learning and compromise.

The multilevel system proposed by Batten has potential in modeling the complicated and conflictual relationships between trading partners. One could conceive of the policy process as having three levels of policy choice--the policy regime, the choice of policy instrument, and the choice of instrument setting--that can be seen as corresponding to Batten's multilevel system. For example, GATT is a regime at the macrolevel that coordinates and enforces the choice of policy instruments decided by countries at the mesolevel. Countries negotiate the level of these instruments, the microlevel, in the iterative fashion that Batten described. This approach could also be useful for modeling the interactions between interest groups concerned with a commodity or between different commodities, and for national governments in deciding upon national policies.

### Dynamic Games

In the previous section, models recognized that countries interact repeatedly through time. In this section, models are presented that are based on the same underlying framework, the critical distinction being the use of solution techniques that allow the model to be fully dynamic. For example, the computer tournament of the prisoner's dilemma is known as a "super game," for it is a static game that is repeated a number of times. Static means that the conditions or choices facing the players are constant through all repetitions of the game. But, in this section, the emphasis will lie on those dynamic games where the choices made in previous periods affect the choices presently available. Dynamic games can be discrete or continuous. They consist of an objective function that the player wants to maximize, subject to a constraint that is affected by the choices made by each player and by time.

Karp and McCalla (1983) evaluated the use of existing oligopoly models of world trade. They are critical of previous models that concentrate solely on one side of the market and thus neglect the important interactions between buyers and sellers. Karp and McCalla used a dynamic game to analyze the imperfect world corn market. They saw the advantages of a game-theoretical approach as

threefold: it can include any number of actors, the dynamic nature of supply and demand is explicitly stated, and the solution gives endogenously determined reaction functions and resulting tariffs, prices, and quantities traded.

The players have conflicting objectives, and a noncooperative Nash solution to the game is sought. Karp and McCalla examined the ramifications of using open loop versus closed loop feedback control. Open loop controls require that each player determine his entire trajectory of controls (choice variables) at the beginning of each game. Feedback control incorporates a conjectural variation in which the control variables are chosen at each period and reflect the reaction of opponents in the previous period and its effect on the state.

Using this framework, the authors analyzed a number of scenarios with the United States, the EC, and Japan as players and a passive rest-of-the-world. In game A, all behave as noncooperative Nash players attempting to exert market power. In game B, the United States and the EC play the game as a bilateral monopoly with a competitive fringe. Using USDA elasticity data, Karp and McCalla analyzed four variations in all, experimenting with varying time periods. Using previous econometric results, they demonstrated that this approach can produce plausible results.

Surprisingly, in general, player responses to a price tended to stabilize it. If the previous world price was high, the EC and Japan would increase their tariffs and the United States would decrease its export tax, and this would drive the world price down. If the previous world price was low, then players' reactions would tend to drive it up. Despite the presence of a bilateral monopoly or oligopoly, nothing indicated that a trade war would break out.

The surprising result reached by this research illustrates the importance of considering the interactions of countries over time in the analysis of commodity markets. However, while this type of game-theoretic approach is useful in understanding the dynamic nature of trade among countries, it necessitates a severe simplification of the policies used and the process that chooses them. Its contribution lies more in projecting what the eventual consequences of a policy will be than in explaining why it was chosen in the first place.

The articles in this section used game theory as a technique for analyzing trade relations over time. The prisoner's dilemma game summarizes the difficulty of achieving free trade. Jensen and Thursby used the prisoner's dilemma game to examine when free trade will occur, and they concluded that a country will adopt a free trade policy when it believes that others will do so as well. Karp and McCalla used a dynamic game to examine interactions in the world corn market. Their work indicates both the importance of correctly specifying the type of market and also the effect of interactions over time. Finally, a recent study by Conybeare (1987) has used a basic game-theoretic framework to analyze a wide range of past trade wars to determine why bilateral trade wars break out. He concludes that game theory provides a useful starting point but it must be augmented by a detailed understanding of the institutional environment.

### **Strategic Interaction In Large-Country Trade**

This section is concerned with the role of strategic interaction and power in trade relations. Present U.S. trade strategy is caught in the crossfire between a continuing commitment to the ideology of free trade and a protectionist movement that believes that a policy emphasizing free trade is no longer economically viable. U.S. interest groups are exerting increasing pressures for protection, citing the loss of domestic jobs and a large trade deficit to support their cause. This phenomenon is a global one, and fear exists that a series of "beggar thy neighbor" policies will result in a global decline of free trade similar to what happened in the 1930's. Questions persist about whether the United States should continue to promote a free trade stance now that it is perceived to bear a disproportionate

share of the cost. An understanding of successful strategies for interaction is essential to developing a pragmatic strategy that protects U.S. interests, while not abandoning a commitment to free trade. The first article reviewed is specifically concerned with this question, while the two following present broader theories on strategic interaction.

### Strategies of Interaction

Goldstein and Krasner (1984) argued that the United States should abandon its attempt to eliminate trade-distorting policies by other states through multilateral negotiation. While the GATT has reduced tariffs, substantial problems remain, including the intractable one of nontariff barriers. These authors argued that the postwar liberal conception of a trading regime that would regulate all traded distortions has not worked out as hoped for, and that the practice of conciliation and threats on the part of the United States has fared no better. They proposed that the United States pursue a Tit-for-Tat strategy that rewards countries who cooperate by following GATT rules. (The Tit-for-Tat strategy is discussed in detail later in this section when work by Axelrod is reviewed.) Violators should be singled out and punished in a case-by-case procedure that follows clear and consistent rules. They argued that the United States is in an ideal position to alter the behavior of its trading partners due to its large domestic markets. The success of the strategy depends on all parties being clear about what constitutes cooperative behavior and what constitutes defection and about the corresponding reward and punishment.

Schelling (1956) presented a tactical approach to the analysis of bargaining, examining the roles of power, institutions, and threats and promises in the process of negotiation. He stated that power depends not only on a commitment but also on the communication of that commitment to the other party. A potent method is to stake one's reputation on the statement of a commitment. The advantage goes to the party that can point to an array of negotiations on which his position could be compromised if he conceded this point. Concessions are facilitated if one can help one's opponent reinterpret his original position so that the concession will not be viewed as incompatible with his previous statements.

Another tactic is to leave the last clear chance to decide the outcome with the other party, relinquishing further initiative only when one has succeeded in rigging the alternative so that the opponent has little choice in his actions. An example of this is coercive deficiency, illustrated by using up an annual budgetary allowance so early in the year that remedial action must be taken.

Schelling stated that due to structural reasons the possibility of commitment may not be equally available to both sides. For example, the ability to make a commitment of a democratic government that is tied to public opinion is different from that of a totalitarian government.

Axelrod (1980) used a computer tournament of the prisoner's dilemma game to compare the strengths and weaknesses of different strategies of interaction. While his work is not directly concerned with trade theory, it is developed in the context of international relations and has the potential of explaining the emergence and maintenance of cooperation between nations. The relevant parallel is that the players are nations and that to cooperate is to continue a policy of free trade, while to defect is to impose an optimum tariff or other forms of protection. Axelrod examined the characteristics of Tit-for-Tat, the strategy that consistently won the tournament against a multitude of other strategies. Tit-for-Tat is a rule that cooperates at first, and then repeats whatever its opponent does. If the opponent defects, it defects. If the opponent cooperates, Tit-for-Tat responds with unending cooperation. Axelrod evaluated why Tit-for-Tat is such a successful strategy, summarizing its strength into four components:

1. Niceness means that a player will never defect first while following a "nice" rule. Being the first to defect is quite costly because it is difficult to regain the trust of your opponent.
2. Forgiveness is the ability to cooperate after the other player has defected. A successful rule must balance being provokable and forgiving, for while it wants to avoid being exploited, it also wants to avoid being caught in a costly rut of defections.
3. Provocability means that a player will defect immediately after an "uncalled for" defection on the part of his opponent. If a rule is not provokable, it runs the risk of being taken advantage of by a more aggressive rule.
4. Clearness is ease of understanding, for the simple rules of the strategy make it easy for players to predict other players' responses.

Axelrod (1981) examined the conditions that favor cooperation in a game played repeatedly. He pinpointed the expected length of interaction as basic to achieving stable mutual cooperation. In a sufficiently long game, the initial advantage that one gains from defection is overshadowed by the long-term disadvantages of retaliation. He concluded that the discount factor with which the player evaluates the future is a key element.

These articles provide ideas about strategic interaction that may explain why some countries are more successful than others in trade negotiations. The articles by Goldstein and Krasner and by Axelrod suggest that the United States should develop a set of rules governing trade relations that are clear and predictable and that it should not deviate from the enforcement of those rules. The articles that follow in the next section discuss how a country's economic and political stature influence the development of a nation's trade strategy.

### **Changing Global Environment and Its Effect on Trade Institutions and Flows**

This review is structured around the idea that it is important to incorporate variables that affect trade into trade models. The first step of incorporation is to identify variables that may be important. The hegemonic power thesis provides potential explanatory variables about the structure of international trade relationships. Power influences the strategic interactions between countries by shaping the perceptions a country has of its options and its ability to carry them out. Power, as an explanatory variable in trade relations, operates at two levels. A country may be a world hegemonic power that has structured international relationships to its own ends by the creation and maintenance of trade regimes. Even without global economic dominance, a country may be powerful by possessing control over the supply of a commodity, particularly a strategic one. We now review the hegemonic power thesis and its implications for international trade. Power over a particular commodity has been amply covered by McCalla and Josling (1981, ch. 2), Caves (1980), and Schmitz and others (1981) in discussions of monopoly and cartel theory.

The hegemonic power thesis models how a dominant world power can structure international relationships to its own ends by the creation and maintenance of world regimes. A necessary condition for hegemony is for a country to have substantial control over raw materials and sources of capital, control over markets, and a competitive edge in technology. This is a necessary, but not a sufficient, condition for a country to be a hegemon. A country must also desire to undertake a leadership role and be willing to incur the costs involved. Hegemons are instrumental in the creation of international regimes, which they use to impose their ideology on others. An international regime is a set of rules and procedures that governs the relations between countries in specific issue areas. GATT is an example of an international regime that provides rules and procedures emanating from a liberal philosophy of free trade. Standards of behavior on the part of the participants are laid out as

well as sanctions for violations. The literature shows differences in opinion over the necessity of the presence of a hegemon for the creation and maintenance of international regimes and for the motivation for dominant powers to incur the costs of leadership.

In his first article, Krasner (1976) used the theory of hegemonic stability to explain the rise and decline of openness in international trade. Using the size of a country and its level of economic growth as indicators of potential economic power, Krasner evaluated how the interests of the country are served by openness in trade. Small countries have more to gain from trade but are also more vulnerable to the instability it causes by the displacement of factors of production. With economic development comes a predisposition toward openness, since developed countries have more mobile factors of production. Thus, a hegemonic power, by definition both large and developed, will have an openness preference because it can benefit from trade while incurring few of the accompanying costs. The hegemonic power, like Britain in the 1800's or the United States in the post-WWII era, must be willing to provide the leadership necessary to establish and maintain an open trading system. Krasner tested his theory using historical data over the past 150 years.

Krasner (1979) used this framework to evaluate the 1979 Tokyo Round of GATT. In the years immediately after World War II, the United States overlooked many trade arrangements that were economically disadvantageous to it in order to promote the liberal vision of cooperation that it felt was necessary to long-term peace and economic stability. With the decline of its hegemonic power, particularistic interests in the United States became more powerful, overshadowing the force of ideology that had previously been dominant in shaping policy. Consequently, the United States, like all other countries, bargained at the Tokyo Round with its short-term interests in mind. Krasner concluded that the outcome of the Tokyo Round was not in accord with any general trade philosophy. In some areas, the liberal ideas of increasing trade, enhancing the autonomy of the market, and upholding the principle of nondiscrimination were expressed. However, in areas where countries felt pressure from businesses threatened by imports, the agreement legitimated state intervention and discriminatory action. Krasner evaluated the prospects for stability for a trading regime no longer dominated by the hegemonic presence of the United States. He concluded that a regime already in place will, by its own inertia, continue to operate but that it may not be able to withstand the buffeting of external shocks.

Keohane (1980) evaluated the role that a hegemonic power plays in the initiation, stability, and demise of international regimes. He began by rejecting the "basic force" model, stating that it is inaccurate because having power does not imply the will and motivation to use it to obtain certain objectives. The hegemonic power imposes rules governing international interactions between countries and oversees their implementation through the creation of international regimes. Keohane described this as "one state is powerful enough to maintain the essential rules of governing and is willing to do so." Keohane emphasized that international regimes exist to facilitate cooperation on issue areas between governments. It is inaccurate to view them as elements of a new international order "beyond the nation state," for countries choose to enter international regimes on the basis that this will not violate their national sovereignty. While it is true that the rational choices a country has may be limited in a world dominated by the military and economic power of the hegemonic state, a country may still choose to reject membership if such membership would be politically damaging. Keohane refuted the notion that the existence of a hegemon is a necessary or sufficient condition for the emergence of the cooperative relationships embodied in an international regime and argued that cooperation may continue after the hegemon's decline. He evaluated the reasons why nations fail to cooperate even when it is in their interest to do so and discussed the conditions necessary to foster cooperation in the absence of a hegemon. Keohane listed imperfect information, high transactions costs, and lack of a legal framework for the enforcement of contracts as important barriers to cooperation. Regimes facilitate the sharing of information by repeated contact over a wide range of issues. They provide standards of expected behavior and approved methods of sanction for violation.

After regimes have in place a set of rules and procedures, the marginal cost of dealing with new issues is lowered, and the regime may become multifaceted in nature. Keohane argued that a small group of countries that share perceived interests and that are capable of monitoring compliance may be successful in initiating an international regime. An easier task is to maintain one during the period of the hegemon's decline. Desire to protect their reputations will motivate countries to overlook possible short-term gains from leaving the regime.

Cahn (1980) elaborated on the hegemonic power thesis with the goal of explaining what factors influence a hegemon's regime strategy. She stated that a hegemon passes through phases of ascendancy, hegemonic power, and decline. Its stage of growth affects the welfare-maximizing strategies it adopts. Issue strength, that is, the country's overall dominance in a commodity, influences that strategy. Indicators of issue strength, while impossible to quantify, are market share, domestic reserves, production capacity, and net imports and exports.

Cahn amended the basic hegemonic power thesis by stating that all issue areas will not simultaneously reflect the position of the hegemon, since each issue area may have its own lag and lead time. She used case studies in wheat, sugar, and tin to assess the validity of the amended model. Cahn proposed that five factors enter into the development of regime strategies:

1. Domestic salience: the importance of the commodity for the economy, defense, or for powerful interests groups;
2. Global market conditions: the current price, production, and supply conditions of the commodity worldwide;
3. U.S. market power: U.S. share of the world market, net exports, and stocks;
4. U.S. issue position: potential issue strength of the United States in political bargaining for a commodity; and
5. U.S. regime strategy: arrangements established to affect the impact of trade of the commodity to be consistent with particular international objectives.

An assessment of the case studies led Cahn to further amend the model to incorporate the importance of domestic goals and the pressure of domestic interest groups. She concluded that, although an overall leadership strategy provides motivation for adopting a leadership strategy at the issue level, actions are influenced by domestic interests as well.

Allen (1978) used the Kennedy Round of GATT negotiations as an opportunity to conduct empirical research on tariff policies and negotiations. Her goal was to evaluate the relationship between the size of concessions made on commodities and the degree of bargaining power held by a participant in relation to its trading partners. Allen used the Shapely value solution to the game-theoretic bargaining situation as an indication of cooperation on a particular good. For an "n" person nonconstant sum game, the Shapely value distributes the gains from cooperation among players, assigning a payoff to each on the basis of his marginal contribution. Two factors influence participants' bargaining power: the higher the value of additional exports evoked from your partners by your tariff reductions, and the more your partners' reductions stimulate your exports to them, the greater your power. Large traders and those with relatively high export supply and import demand elasticities would thus tend to have larger power values. Allen tested the hypothesis that bargaining power will be related to the concessions made by a country. She regressed the percentage change of the nominal tariff rates imposed by a country on the trade power index (TPI) and the level of nominal tariffs that existed in 1964. While the results of the study supported the hypothesis, strong results were not obtained on the

significance of the trade power index. Conditions in 1964 were such that the United States had virtually equal power on all goods analyzed. Allen was optimistic that under conditions of variation on the TPI better results would be obtained.

Conybeare (1984b) elucidated the differences between the characteristics of the prisoner's dilemma and of public goods in evaluating aspects of international trade, since he felt that the distinctions have become blurred and have important policy ramifications. He argued that trade does not exhibit the nonexcludability and joint supply that characterize public goods. Conybeare stated that international trade is more likely to exhibit the characteristics of the prisoner's dilemma, for although free trade is globally optimal, it is not the optimal strategy for any one country. He argued against the hegemonic power thesis, stating that there is little economic incentive for large powers to perform a stabilizing role. The exact opposite should be true because hegemons have more incentive to impose restrictions since they have greater capacity to divert world income. He noted that the association between openness and hegemony is weak either on a time-series or on a cross-sectional basis.

The articles in this section discussed the relationship between a country's economic and political goals and stature and its openness in trade. Krasner used the theory of hegemonic stability to explain the demise of the United States as a protector of free trade. Keohane and Cahn elaborated on the hegemonic stability thesis. Keohane argued that under certain conditions small countries with common interests can uphold a trade regime in the absence of a hegemon. This argument bears directly on questions facing the United States today with the reopening of trade negotiations under GATT. If the United States feels that it can no longer bear the burden of providing stability and of advancing the cause of free trade, can it restructure trading relationships so that together a number of countries undertake this role? It is important to note that Conybeare disagreed with the theory of hegemonic stability and presented both theoretical and empirical arguments against it.

## Conclusions

One goal of this second section was to understand the factors that influence a country's decisions about its trade policies. Another theme addressed was how economists could make models of international trade more realistic by including these variables.

The factors influencing a country's trade policy are many. If a country is large in a market and recognizes its market power, it may attempt to benefit from the policies it chooses. This is the large, active country case discussed at the beginning of this section. However, large countries must account for the dynamics of trade relations and evaluate what response other countries may take to their attempt to utilize market power. The articles on reaction functions and conjectural variations discuss how countries include an expectation of retaliation in their policy choices and then further trace the effect these expectations have on the policies and the eventual market outcome. Finally, the emphasis was shifted from interactions between countries in a market to interactions between countries as economic and political units with disparate amounts of power. The influence of an international regime and of a country's position within that regime were discussed.

Recognition of the numerous and complex factors influencing trade between countries has been followed by attempts to include these subtleties in mathematical models of trade. This section included discussions of the difficulties of incorporating market power, reaction functions, and conjectural variations into models. While game-theoretic approaches are useful, they can usually only include a limited number of the features that characterize a market. Finally, no mathematical model can include the factors of international political power discussed in the last section. The broad view that the hegemonic power thesis presents can be valuable in structuring a simpler model and in formulating the questions asked of it.

This section of the literature review has concentrated on the international influences that shape a country's policy decisions, while the earlier section discussed domestic influences. How these two sets of concerns are balanced and how the conflicting elements are resolved is by the policy process is the topic of the next section.

### **Reconciliation of the Domestic Political Process With International Interactions**

In the following section, we examine some of the literature that attempts to integrate domestic interest groups and their effect on trade.

Two approaches are analyzed. The first approach includes work by Caves, Helleiner, Anderson, Lavergne, and Honma and Hayami. All of these authors examine the relationship between tariff protection and the characteristics of domestic industries. These characteristics can be divided into two categories: those that make a lobby effective and those that make society predisposed to offer the industry protection. The second part of this includes work concerned with endogenizing government policy behavior. This means that a trade model includes an analytical or empirical model that explains the choice of government policy variables. Only by attempting to understand the consistency of government choices can forecasting models be developed for markets that are greatly affected by government actions. Abbott's work is a first step in this direction. Abbott (1976) explained the factors influencing the domestic price of a good, although he estimates a reduced-form equation. Lattimore and Schuh (1979) included equations explaining the level of government intervention in their model of Brazil's beef sector. Their work is an important attempt to estimate the influence of conflicting goals held by the government. Dixit and Martin (1986) used an econometric model of the U.S. coarse grains sector to investigate the relationship between the economic and policy environments. Paarlberg (1983) expanded the single-country focus of Lattimore and Schuh's article to a multicountry trade model. It included endogenous policy determination and interactions between countries.

### **Explaining the Choice of International Policies: The Case of Tariff Barriers**

Caves (1976) sought an explanation of the pattern of tariffs that protects Canada's manufacturing industries. He proposed three models of political behavior. The Adding Machine Model assumed that the government chooses policies to maximize its probability of reelection by a geographically represented electorate. The Interest Group Model examined the variables that influence the advantages an industry seeks to secure by gaining tariff protection. Finally, the National Policy Model assumed that the government set tariffs to reflect a national preference about the industrial composition of the economy. With these models in mind, Caves isolated a number of variables that he hypothesized were related to an industry's success in gaining a protective tariff. Some, but not all, are listed below:

1. Value added per worker: This is an indication of labor intensity. Caves hypothesized that industries with a higher degree of labor intensity will gain higher rates of protection because "labor has the votes."
2. TRN (a weighted average of truck and rail shipping costs per dollar worth of product): TRN is used to measure the dispersion of the industry. Dispersion is hypothesized to increase its political power, especially outside the manufacturing heartlands where it can dominate local interests.

3. Index of seller concentration: This has a positive relation to tariffs because concentrated industries can avoid the problem of free-riders and have excess profits to use in financing lobbying activities.
4. Indexes of growth and diversification: These measure an industry's exposure to economic adversity, hypothesized to justify intervention in the form of tariffs.

These are 4 of the 11 variables that Caves regressed on nominal and effective tariff rates to test the three alternative models of tariff formation. While the results were not conclusive, he stated that the Interest Group Model fared the best on the basis of significant variables and correct signs. He concluded that there is not much difference between nominal and effective rates of protection with relation to the independent variable.

Helleiner (1977a) evaluated the Interest Group Model proposed by Caves and suggested several modifications. He stated that a missing link is the influence of foreign countries in multilateral rounds under GATT. He hypothesized that cuts in tariff rates have not been as deep for those manufactured products in which developing countries are most competitive because developing countries have little to bargain with and are not required to reciprocate. Unskilled labor intensity is a characteristic of the industries in which developing countries are competitive. Helleiner proposed that the average wage and the extent to which value added for manufacturing rose with scale are good indicators of unskilled labor use. He excluded four variables used by Caves: buyer concentration, growth rate, transportation costs, and the degree of specialization. Firm size and resource intensity were added. Results indicated that unskilled labor intensity is now the most significant variable, and he concluded that its influence stems from both domestic and international political influences. Further, his results support a political economy explanation that argues that labor influence and transnational enterprises are important determinants of Canada's tariff structure.

Anderson (1977) hoped to quantify the effect on income distribution caused by changing the effective rates of protection given to Australian industries and to understand why trade barriers are erected and maintained. He attempted to separate the winners and losers from changes in the level of protection and hypothesized that:

1. The original owners of land and capital in a protected industry gain from the granting of protection but workers do not.
2. Entrants to a long-time protected industry receive no benefits. Having paid a premium for entry, they will, however, support the continuation of protection to maintain the value of their investment.

Anderson evaluated the conditions conducive to an industry being given protection. Pointing out that tariffs on imports raise revenues, while subsidies are a drain on treasury funds, he hypothesized that industries with a competitive advantage will receive less support than import-competing ones. He also suggested that a declining industry is more likely to receive support in the form of price maintenance than a thriving industry is likely to receive price increases that would increase its profits. Anderson elaborated on Mancur Olson's (1965) theories that the number of firms in an industry will affect the techniques used and the success enjoyed in their quest for protection. Additionally, he expected that the greater the expected benefits to factor owners, relative to the cost the protection imposed on factor owners in other industries, the more likely they are to succeed. Anderson concluded from empirical testing that industries with a relatively small number of firms will receive more protection due to greater ease of organization. Industries that are small in absolute size are also favored because they cost less to protect than large industries.

On the basis of his empirical work on Australian industries, Anderson concluded that laborers gain little but owners of capital gain substantially if the industry is small and labor mobile. The more labor intensive and the smaller the share of output going to value added in an industry, the more an increase in that industry's protection raises the shortrun return to capital. He concluded that free-rider problems result in strong pressure by interest groups to increase protection with little active pressure to reduce it.

Lavergne (1983) thoroughly reviewed hypotheses about how the structure of tariff protection is determined and what motivates changes in its levels. He examined a wide range of variables suggested by the political economy literature as explanatory for the rates of protection received by an industry. Lavergne recognized two major schools of thought about why tariffs are erected and maintained. The "opportunistic" approach includes pressure group models that believe that the government responds opportunistically to political leverage. The "Principled Government Behavior Model" is the antithesis of interest group models because here the government adheres to altruistic principles regardless of the political pressure.

Lavergne questioned the assumption of selfish behavior on the part of politicians, who the Pressure Group Model assumes behave in the manner of utility-maximizing consumers. He argued that moral responsibility plays a predominant role in the decisions of politicians and bureaucrats, making them qualitatively distinct from consumers. Lavergne presented six categories of factors that are hypothesized to influence tariff rates:

1. Opportunistic responsiveness to interest group pressure,
2. The comparative disadvantage of the industry,
3. Efforts to minimize displacement costs,
4. The maintenance of historical continuity,
5. Efforts to maximize the bargaining value of concessions made in international tariff negotiations, and
6. Miscellaneous aspects of the public interest (for example, defense or antitrust policy).

He stated that categories 2 and 3 may represent elements of either principled or interest group behavior, while category 1 belongs solely to the interest group model and categories 4 to 6 represent principled behavior. Lavergne examined, in detail, the theories behind each factor and discussed variables appropriate to measure their influence. He performed extensive regression analysis on 32 variables. His results indicated that historical continuity is an extremely important factor in the maintenance of tariffs and that variables measuring comparative disadvantage were second in influence. He concluded that little evidence supports the widespread pressure group explanation, in contradiction to the conclusions by Caves discussed earlier. Lavergne conceded that placing primary importance on historical continuity begs the question of what forces motivated the original tariff structure.

Honma and Hayami (1986) investigated the causes of the level of protection for agriculture that exists in industrialized countries. They proposed to test a number of hypotheses about factors associated with the level of protection. The first hypothesis is that the level of agricultural protection is inversely related to the comparative advantage of agriculture. Their calculations of the nominal rate of protection (NRP) for agriculture in 10 industrialized countries indicates that in 1980 the United States had the lowest level of protection among the countries included and that Switzerland had the

highest, with Japan in second place. They explained the fact that Japan moved from a low NRP in the 1950's to a high one in the 1970's by the fact that labor productivity in the manufacturing sector increased at twice the rate of the agricultural sector in real terms during this time period.

They proposed that political demand for protection changes as a country develops. The cost of rapid intersectoral adjustment, including massive migration to urban sectors, and a large disparity in income between the urban and rural sector increase the demand for protection. With a smaller agricultural sector, the cost of organizing decreases as small groups are widely hypothesized to be more efficient lobbying units. This also increases the effective demand for protection. Development has consequences for the supply of agricultural protection as well. As the rural sector declines in relation to the urban, the per capita cost of farm support declines because a large and growing sector is supporting a small and decreasing one. As the percentage of the urban consumer's income spent on food declines, the consumer is less affected by high price food policies. These factors reduce the political costs of supplying protection to the agricultural sector.

Finally, Honma and Hayami hypothesized that the terms of trade between agricultural and industrial products has influenced the level of protection over time. They observed that NRP's increased for most countries between 1955 and 1970 as the terms of trade turned against agriculture because of the accumulation of surpluses in the leading exporters. As expected, the NRP's decreased between 1970 to 1975 as prices rose in response to shortage conditions. To test these hypotheses, Honma and Hayami regressed the nominal protection coefficient (NPC) against eight explanatory variables. The NPC is the ratio of the value of agricultural output in domestic prices to its value in border prices. Explanatory variables included two proxies for comparative advantage, two proxies for the relative share of agriculture in the economy, and a variable representing the international terms of trade, as well as dummy variables to represent the effects of the formation of the European Community, a neutral country's nonalliance military stance and a factor specific to Japan. Results indicated that 70 percent of the variation of the NPC could be explained by the labor productivity ratio between agriculture and industry, the share of agriculture, and the terms of trade. The coefficients were of the correct sign and were significant. The results indicated that the level of agricultural protection rises as the comparative advantage shifts away from agriculture, as the share of agriculture in the total economy declines, and as the international terms of trade turns against those commodities. This basic model is embedded in a broader study by Anderson and Hayami (1986).

Caves, Helleiner, Anderson, Lavergne, and Honma and Hayami each investigated the relationship between the characteristics of an industry and the structure of protection within a country. A wide variety of hypotheses were advanced and empirically tested. Unfortunately, the authors' conclusions varied a great deal. Caves concluded that the interest group model was the most successful of the three that he tested. Anderson's empirical results supported Mancur Olson's hypothesis about the advantage of smallness for groups seeking protection. Lavergne concluded that inertia is the most important determinant of tariff levels, with comparative advantage being second. Honma and Hayami's work also suggested the importance of comparative advantage, with the share of agriculture in the economy and the international terms of trade also being determinants. From the wide variety of questions asked, hypotheses posed, and conclusions reached, there is no obvious or simple answer about the process of tariff formation. While comparative advantage may be a convincing argument for tariffs, the policy process is a political one that is open to a wide variety of influences. The political nature of the process may be one reason why the structure of tariff protection is inconsistent and without a clearly defined pattern.

### **Endogenizing Government Policy Variables**

An important line of inquiry is concerned with attempting to endogenize policy variables that have an effect on the nature and direction of trade flows. Government policy variables are the actual

instrument choices along with their specific levels of implementation, such as the loan rate and its level. To endogenize government policy variables means that the choice, or the level, of the instrument is explained within the model. It is not given solely as an explanatory variable for production or consumption decisions, but instead, it is also explained in the model by the factors motivating the decision process.

Abbott's (1979b) work is included as an important early attempt to endogenize government policy behavior into a trade model. He rejected trade models that ignore or treat as exogenous the important market distortions caused by frequent government intervention in the marketplace. Abbott discussed a number of reasons why developing countries set domestic prices for imports that are not equal to the border price. A shortage of foreign exchange and a desire for self-sufficiency are two of the reasons discussed. Abbott proposed an alternative to neoclassical trade models by attempting to endogenize government policies in the estimation of international trade flows. He specified an equation for the domestic price of the imported good as a function of domestic production, foreign exchange constraints, stocks, aid in kind, and the world price. The equation is a reduced form because no explanation is given about the policy process behind the choice of those variables. Abbott did not specify equations for two other instruments of government policy, stocks and the producer price, but he mentioned that they could be modeled in a similar way. Abbott then specified equations for domestic supply and demand, with the demand equation containing the domestic prices as an explanatory variable. The net import demand equation was formulated by subtracting domestic supply and demand, and the variables in the supply and demand equations were substituted in.

He estimated this reduced-form model for two commodities, wheat and feed grains, in 33 countries using annual data from 1951 to 1973. His results provide evidence for rejecting models that are based on a one-to-one correspondence between production and trade. Abbott's estimation techniques have been criticized for violating the assumptions necessary for reduced-form equation estimation (Rausser, Lichtenburg, and Lattimore, 1982). The reduced form that he constructed can be estimated only for periods of consistency in the policy set and the policy process that generates it. Rausser and his colleagues argue that this condition was not upheld, making Abbott's estimation invalid. In a different article, Abbott (1979a) discusses the contributions and limitations of estimating reduced form equations versus structural models of government behavior.

Lattimore and Schuh (1979) attempted to model Brazil's policy process as it affects beef and to incorporate these policy equations into a production, demand, and trade model of the beef sector. They argued that Brazil has two competing objectives for the beef sector: first, to keep food prices low and stable for domestic consumers, and second, to use beef exports to earn foreign exchange. Their econometric model has three blocks: an intervention block that determines the amount of government intervention between domestic and international beef prices, a domestic supply and demand block, and a block linking Brazil to the international beef market.

The level of government intervention in the market is indicated by the difference between the domestic and international price of beef. The government uses differential exchange rates and export quotas in order to achieve its intervention goals. An increase in the level of intervention decreases the domestic price of beef and occurs when the government is concerned with keeping food prices low. Lattimore and Schuh hypothesized that a measure of the government's interest in keeping down the price of beef is the domestic level of inflation. The government's desire to decrease intervention and to increase foreign exchange earnings is indicated by the country's balance of payments position. It was hypothesized that when the balance-of-payments is in surplus, the government will pay more attention to its goal of low beef prices for consumers. The f.o.b. (free on board) price is related to the level of intervention as well, for as it increases, the level of intervention must increase in order to maintain a constant level of prices in the domestic market.

The level of intervention is regressed on the f.o.b. price of beef, the inflation rate, the balance of payments, and dummy variables to account for shifts in trade policy over time. The domestic supply and demand block and the international trade block were also estimated, but those results will not be discussed here because our concern is with the innovation of the policy intervention equations. Results for the intervention equation were quite good, since all three economic variables were significant and of the hypothesized sign. The results can easily be interpreted in terms of the elasticities. The authors conclude that if the rate of inflation rises from its mean level it is estimated to result in an increase in the level of intervention by 28 percent and to decrease the domestic price by 23 percent. An increase in the balance of payments by 500 million cruzeiros is estimated to result in an increase of 16 percent in the intervention level with a decrease of 13 percent in the domestic price of beef.

Dixit and Martin (1986) built and utilized an econometric model of the U.S. coarse grains sector that demonstrated the feedback between the economic and policy environments. They stated that the major contributions of their study are to:

1. Identify factors that influence the levels at which the government establishes policy instruments such as support prices, loan rates, and diversions rates, and
2. Illustrate how an econometric model that incorporates endogenous policy variables can be used to analyze potential government response to changes in the economic environment.

Their conceptual model has four blocks: a supply block, a demand block, a policy block, and a trade block, as well as a market-clearing identity. The policy block consists of the effective support price, diversion rate, and loan rate for corn. The policy variables are specified as follows:

1. Support price =  $f(\text{a ratio of farm to nonfarm income, corn yield, support price at } t-1), \text{ and}$
2. Diversion payment =  $f(\text{support price, corn area set aside, variable cost of corn production}), \text{ and}$
3. Loan rate =  $f(\text{futures price, interest rates, value of government-owned corn stocks, and the loan rate at } t-1).$

Their econometric model illustrates how the supply, demand, policy, and trade blocks interact with each other over time. The support price and diversion payment primarily affect the recursive supply block. The loan rate influences the stock variables in the demand block. Policy instruments are based largely on economic conditions in previous years, including stock levels.

Dixit and Martin concluded that change in domestic production is an important determinant of policy decisions, with a major surplus or shortage affecting government decisions for 5 years even though the structure returns to equilibrium in 3 years. They also concluded that the government responds much more quickly to changes in the domestic environment than in the export market.

Paarlberg and Abbott (1986) modeled the international wheat trade, recognizing both market power and interest group influence in determining endogenous policy variables. The first step of the analysis was to develop a conceptual model of each individual country's domestic wheat sector. The maximization problems of wheat producers and consumers, of livestock producers, of private stockholders, and finally of taxpayers and public stocks were formulated. Each country's policymaker has six endogenous policy instruments at his disposal to influence wheat production and flour milling, livestock production, private and public stock, and trade. Estimates of the parameters faced by the policymaker in each country are obtained by econometrically estimating domestic behavioral relationships of supply, demand, and stocks.

The relative influence of political groups on the policymaker is estimated using the revealed preference approach. The revealed preference approach works backwards, beginning with an observable function. Assuming that the policymaker is rational and that he faces certainty in the market, Paarlberg and Abbott state that observed behavior represents an equilibrium that satisfies first order conditions. Substituting in the known values of policy instruments and levels of stocks and supplies of wheat, they solve for the weight the politician places on a particular group. The next step was to determine each country's conjecture of the policy retaliation that it faces in world markets. The researcher must specify the structure of the market at this point, with cartel, cooperative, noncooperative, or damage goals as possibilities. Given the structure of the game and the political weights of interest groups and relying on observed outcomes, first-order conditions are used to determine the country's conjecture of its world market influence.

Countries are linked together through the level of trade, the world price of wheat, and the slope of the excess supply or demand relation. Analytical difficulties arise if more than one country is setting policy based on the responses from trading partners, for in this case, the excess supply and demand functions are not uniquely determined. Paarlberg and Abbott used a game-theoretic approach to solve this problem. They extended the work of Thursby and Jensen on conjectural variations by endogenizing the conjectures, linking them to other aspects of the country's behavior. While Thursby and Jensen restricted their analysis to the use of the tariff, Paarlberg and Abbott used five domestic policy instruments as well. With this framework in place, they solved the model and proceeded with simulations of changes in the economic environment. A crop shortfall in the United States, a reduction in the European Community's threshold price, and formation of an export cartel are examples of the simulations performed.

Paarlberg and Abbott attempted to incorporate many of the features that were proposed in the first part of this review as important considerations into their model. To do this, a few important assumptions were made that must be assessed as the shortcomings of their approach. Paarlberg and Abbott utilized the story of a single rational decisionmaker who assigns weights to the welfare of interest groups concerned with domestic wheat policies. This approach is weak in describing why the decisionmaker assigns the weights as he does, since it says only that the weights serve to rank the decisionmaker's attitudes toward the welfare of various groups and depend upon political factors such as campaign contributions and votes. This approach also neglects the role of institutions and history in determining policy outcomes. The revealed preference approach used assumes that the system was in equilibrium and that policymakers achieved their goals, both rather heroic assumptions.

The work in this section by Abbott, Lattimore and Schuh, and Dixit and Martin used behavioral equations in an attempt to endogenize the policy process into economic model. A behavioral equation relates a policy outcome to the factors believed to be influential. It is important to note that the policy result, not the policy process, is endogenized. The behavioral equation contains variables that the government may be considering in making this decision, but says nothing about how the decision is reached. It leaves out information about the interests and relative strengths of the groups involved and about how they go about reaching a compromise. Despite their limitations, the incorporation of behavioral equations in this research is a useful step in attempting to understand and incorporate the policy process into economic models.

## Conclusions

This section reviewed the literature that attempts to integrate the influence of domestic interest groups on policy and its international trade. This process reconciliation is depicted in figure 1, which depicts the process as an iterative one. The process of reconciliation by legislators considers both the domestic and the international goals of the country, the constraints posed by membership in international institutions, the response of other countries, and finally, the effect of both the original

policy choice and the policy response of other countries on the world price. How far does the work reviewed succeed in capturing this complicated process?

The literature on tariff formation mainly concentrates on linking characteristics of domestic industries with their success in achieving tariff protection. This work is largely unidirectional since it does not recognize the potential response of other actors in the market, nor does it recognize how the level of protection will feed back into prices and the character of the industry. By evaluating the international comparative advantage and the bargaining power of the industry, some authors do consider the characteristics of the industry in an international setting. However, this work is similar in scope and technique to much of the work considered in the first section of this review.

The literature reviewed on endogenizing government policy variables attempts to include the variables that influence government policy decisions within the trade model. If the domestic model is linked to an international model of price formation, then the iterative process between economic conditions and political decisions described in figure 1 can be captured.

Finally, Paarlberg and Abbott explicitly include an anticipation of the potential response of other actors in the market by the choice of a game-theoretic framework. However, the dynamic framework used by Paarlberg and Abbott requires other simplifying assumptions. It is up to the researcher to ascertain if the benefits of modeling the anticipation of response is important enough to justify the cost of those assumptions.

### **A Possible Framework for Analysis and Some Conclusions**

The problem posed at the beginning of this report was one of understanding trade relations in a framework that accounts for the importance of politics in economic relations. These political influences were divided into two spheres. First is the sphere of domestic politics, which is composed of the interactions of domestic interest groups, legislators, and the executive branch in the formation of national policies. The second sphere is the sphere of international politics, with international institutions and foreign governments interacting with each other and with the domestic sphere. No single model of international agricultural trade can hope to encompass all of these interactions. To do so would require a general equilibrium framework of unworkable dimensions. This review has attempted to present a wide array of influences for the researcher to consider. The issue at hand should help to choose the appropriate scope of analysis. We present the following classification system of economic policy choice to attempt to break this question into manageable components. Three levels of choice are presented here, including the choice of policy regime, the choice of instruments with which to implement that regime, and finally, the implementation level of those instruments.

A regime can be considered as the set of policy instruments that are implemented in accordance with a generally accepted set of societal goals. While instruments change, there is generally some continuity in goals, intentions, and results. Regimes resist change; a high degree of social upheaval and political chaos is usually required to motivate the change of regimes. Examples of regimes include the adoption of the Agricultural Adjustment Act by the United States in 1933, which paved the way for continuing government involvement in agriculture. The implementation of the Common Agricultural Policy by the EC in 1962 is another example.

Several articles in this review have addressed the issue of the choice of regimes and the forces which motivate regime change. Honma and Hayami (1986) present hypotheses as to why industrialized countries undertake support for their agricultural sectors. Schick (1983) traces the evolution of Congress as an institution that adapted to economic prosperity with a lag as it became accustomed to a

different role under the new regime. At this point, however, it remains unclear whether or not the downturn in economic conditions is enough to cause the end of this regime of support for agriculture. While these tensions exist, the outcome will remain unclear.

Another regime that has been considered in this review is the regime of free trade, which the United States has fostered since the end of World War II. The United States structured and dominated a free trade regime through the creation of international institutions. The articles on hegemonic power discuss this phenomenon and the conditions that may lead to the demise of the regime.

Both of these arguments support the hypothesis of Petit (1985), who suggested that, in the long run, economic forces are important determinants of the policy process, although in the short run decisions are made on a political basis. In other words, policies that contradict longrun economic trends cannot be maintained indefinitely.

The second level of policy choice is that of the choice of tools used to accomplish regime goals. At one level, social preferences are a major determinant of instrument choice. Both the United States and the EC believe that farmers should receive their compensation through the marketplace. This precludes the choice of direct income payments as a method of supporting farm income and makes price supports an acceptable alternative. Canada, like many countries, sells its wheat through a monopoly marketing board. While the United States might derive many advantages from such a system, a strong societal preference for a free market eliminates it as an option.

At the other extreme, it appears that some instruments were chosen because such intense ideological differences existed that the choice was narrowed down to the lowest common denominator. This is the choice that is inoffensive to all and is chosen for its political expediency, not its relevance to the problem. In the 1950's, Secretary of Agriculture Ezra Taft Benson and agricultural interest groups were at odds, and consensus could not be reached on major issues. Farm income was declining and stocks rising, while the debate continued over supply control and price supports. Public Law 480 was enacted to help dispose of U.S. surpluses overseas. While this choice did not solve the problem or resolve the debate, it was a solution that was acceptable to many.

Interest groups, legislators, and the implementing agencies are all actively concerned with and involved in the process of instrument choice. Casual examination of the introduction of new policies suggests the hypothesis that new ideas are tried when the political costs of maintaining present programs are very high. In terms of wheat programs, this suggests that when the political cost of stocks was too high, both Public Law 480 and massive land retirement programs were introduced. More recently, the reintroduction of credit and export subsidies through the Export Enhancement Program has taken place. While the articles in this review do not directly deal with this question, they do shed light on the pressures and processes that guide these policy choices. The work on vote trading, coalitions, and interest group pressure all fit in this category. Conjectural variations and game theory evaluate the consequences of the introduction of a tariff. Rent seeking evaluates the welfare loss due to the choice of a quota versus a tariff.

The third level of policy choice is that of instrument adjustment. For American agriculture, the most important and predictable occurrence of instrument adjustment occurs with the passage of multiyear omnibus farm bills. Again, the first part of the review tries to understand the legislative process that makes these choices. The second half of the review looks at the implications of these choices in international terms. This section also begins to evaluate the problem of how the international goals and posture of the country limit the choices the country can make. Lattimore and Schuh's (1979) work on the adjustment of intervention of Brazil in its beef sector is an example of empirical work that addresses this policy choice. Paarlberg's (1981, 1983) work is an extension that also addresses

the behavioral relationships between interest groups and the government, and the relationship between trading partners.

We have just described a three-level categorization of policy choice, and throughout our review, we have attempted to demonstrate the necessity of accounting for the interdependence that exists in countries through policies. Is it possible for the researcher to include all of these issues in his work, particularly in an empirical model? Examination of most trade issues may assume that the regime is fixed. Considering the long duration of regimes, this appears a reasonable way to proceed. In fact, empirical analysis requires the regime to remain fixed because a significant structural change will accompany a change in regime. The question of regime change is probably limited to qualitative analysis due to its infrequency and accompanying social and economic upheaval. The question of instrument adjustment looks most promising for incorporation into empirical models.

While it is obvious that trade and policy adjustments occur over time, the best tool for capturing this process is not obvious. Fully dynamic modeling requires great simplification of the behavioral equations of the actors involved. The tradeoff between dynamic modeling and iterative or other, richer, approaches is left to the analyst.

This literature review proposed to place the question of agricultural trade into a broad framework and to sample some of the many aspects of the problem. While substantial work exists on components of the problem, little has been done to integrate these components and to incorporate them into trade models. The work now emerging in this endeavor, often under the umbrella of "endogenizing government behavior," is a useful area for further research.

### Summary

The intent of this paper was: (1) to develop a general framework for analysis of policy in markets that are subject to extensive government intervention and (2) to review a wide variety of literature that addresses domestic policy formation in the political arena and the linkages between domestic political choices and their ramifications in international markets. The first part of the review examined the process of how domestic policies are chosen by identifying the key players who influence and implement government policies--special interest groups, legislators, bureaucrats--and examined the interaction among these groups. Key themes included: (1) that each group considered, including policymakers, interest groups, and bureaucrats, pursue their own maximization objective rather than maximizing some notion of social welfare function; (2) that empirical evidence is often conflicting as to why actors in the process do what they do; (3) that small special interest groups are more effective than large groups as evidenced by the increase in political power of agricultural commodity groups; (4) that policymaking is influenced by short-term political considerations but conditioned by long-term economic reality; and (5) that the complexity of agricultural policy formation has increased, as evidenced by the greater number of actors who influence agricultural policy, for example, commodity groups, nonagricultural groups, and government agencies.

While the first part of the literature review focused on the process of domestic policy choice, the second part examined models that incorporate the international consequences of domestic policies as well as how countries use their economic and political power in a global setting. Rather than endorse a particular model type, this section reviewed a variety of trade models that incorporate many different quantitative techniques in the attempt to capture policy linkages including reaction functions, game theory, conjectural variations, and strategic interactions. One theme recurring throughout this paper is that the problem should dictate model selection and not the reverse. This is particularly true in the second section of the review, where the effectiveness of government strategies are dependent on

whether a country is large or small, as a large country can affect the world market with its production or trade decisions whereas a small country can not.

While the first section focused on domestic policy choice and the second on international influences, the third section sought to reconcile domestic and international influences in the policy process by examining: (1) the relationship between tariff protection and characteristics of protected domestic industries, and (2) models that endogenize government behavior. Empirical analyses of tariff protection and its relationship to the structure of the domestic industry thus protected resulted in conflicting conclusions, including the political power of the industry as a special interest group, the size of the industry with small groups being politically more effective than large groups, and finally, the comparative advantage of an industry. The political nature of the tariff formation process may be one reason why the structure of tariff protection is inconsistent and without a clearly defined pattern. Finally, behavioral models, which endogenize government behavior, were reviewed. These models analyzed such policy results as the price-support level or loan rate and sought to capture variables that the government may be considering in its decisions. This is an important step in attempting to understand and incorporate the policy process into economic models. This final section proposed a hierarchical framework for disaggregating the very complex problem of policy interdependence in world agricultural markets.

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
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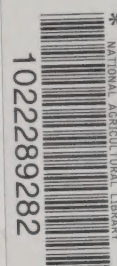
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